December, 1949

THE FOUNDRY

wherever metals are cast...

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Good Steel and Iron have an inseparable companion, too

- - - Good ferro-alloys

Ohio Ferro-Alloys are used by leading steel producers in the melting of America's finest steels.

Ferro-silicon 25, 50, 65, 75, 85, 90%
Special blocking 50% Ferro-silicon
Low Carbon Ferro-chrome Silicon
High Carbon Ferro-chrome
Ferro-manganese
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BRIQUETS

SILICON • MANGANESE • CHROME
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Ohio Ferro-Alloys Corporation
Canton, Ohio

Chicago Detroit Pittsburgh San Francisco Tacoma

6 IRON-CLAD REASONS FOR PURITE'S SUCCESS!

MORE AND MORE leading foundries are using Purite—the most economical desulphurizer you can get. The reasons for this growing acceptance of Purite are as practical and pleasing as good iron and sound castings! Check these points for yourself:—

1. **PURITE comes in 2-lb. briquettes—no weighing or measuring required.**
2. **PURITE is 100% fused soda ash—you do not pay for inert materials.**
3. **PURITE does not crumble—no waste—no dust.**
4. **PURITE can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without any deterioration.**
5. **PURITE gives *100% fluxing action* in the cupola.**
6. **PURITE is the best and most economical refining and desulphurizing agent for ladle treatment.**

These are some of the indisputable benefits which explain why Purite is still the outstanding cupola flux and ladle desulphurizer available today. You'll want to know more about why Purite is so popular with so many leading foundries—so write today for full, factual information. Mathieson Chemical Corporation, Mathieson Building, Baltimore 3, Maryland.

Mathieson
CHEMICALS

Purite is sold by all leading foundry supply houses in the United States and Canada.

PURITE 100% FUSED SODA ASH
THE SCIENTIFIC FLUX FOR BETTER MELTING AND CLEANER IRON

You Can Save

TIME...MONEY...TROUBLE

with

CAST NICKEL ALLOY STEELS

A fundamental difference exists between alloy steel castings and those of plain carbon steel . . .

The *unmatched combination* of properties available in nickel alloy steels, cast to shape, assures superior performance, greater dependability and lower ultimate cost.

MEET EXACTING REQUIREMENTS

Engineering requirements often call for castings with properties that are attainable only by heat treatment. Since castings are generally complex shapes and frequently vary in section thickness, simple normalizing treatments are often practiced. When quenching and tempering are necessary, substantial economies can result from using steels that adequately resist the tendency to warp and crack.

RESPONSE TO HEAT TREATMENT

Cast nickel alloy steels provide basic advantages for fabricator and user, alike. Well beyond the reach of carbon steels are the combinations of strength or hardness and toughness which can be obtained in nickel steel castings by simple normalizing. Their response to mild quenching avoids distortion and cracking, thus permitting the attainment of high strength with adequate ductility in large, cumbersome sections. This simply can't be done with carbon steels.

CONTROLLED IMPROVEMENT

Nickel additions permit controlled improvement of desired properties in steel. Such control has resulted in use of cast nickel steels in main frames for steam locomotives since the early part of this century. High toughness . . . and strength along with ductility . . . are primary requisites in railroad service. Significantly, railroads now are the largest tonnage users of nickel alloy steel castings.

ADVANTAGES OFFERED

Extensive use in oil production, hydroelectric plants, steel rolling and forging, mining, milling, smelting and other heavy industries indicates growing recognition of the following advantages offered by alloy over plain carbon steel castings:

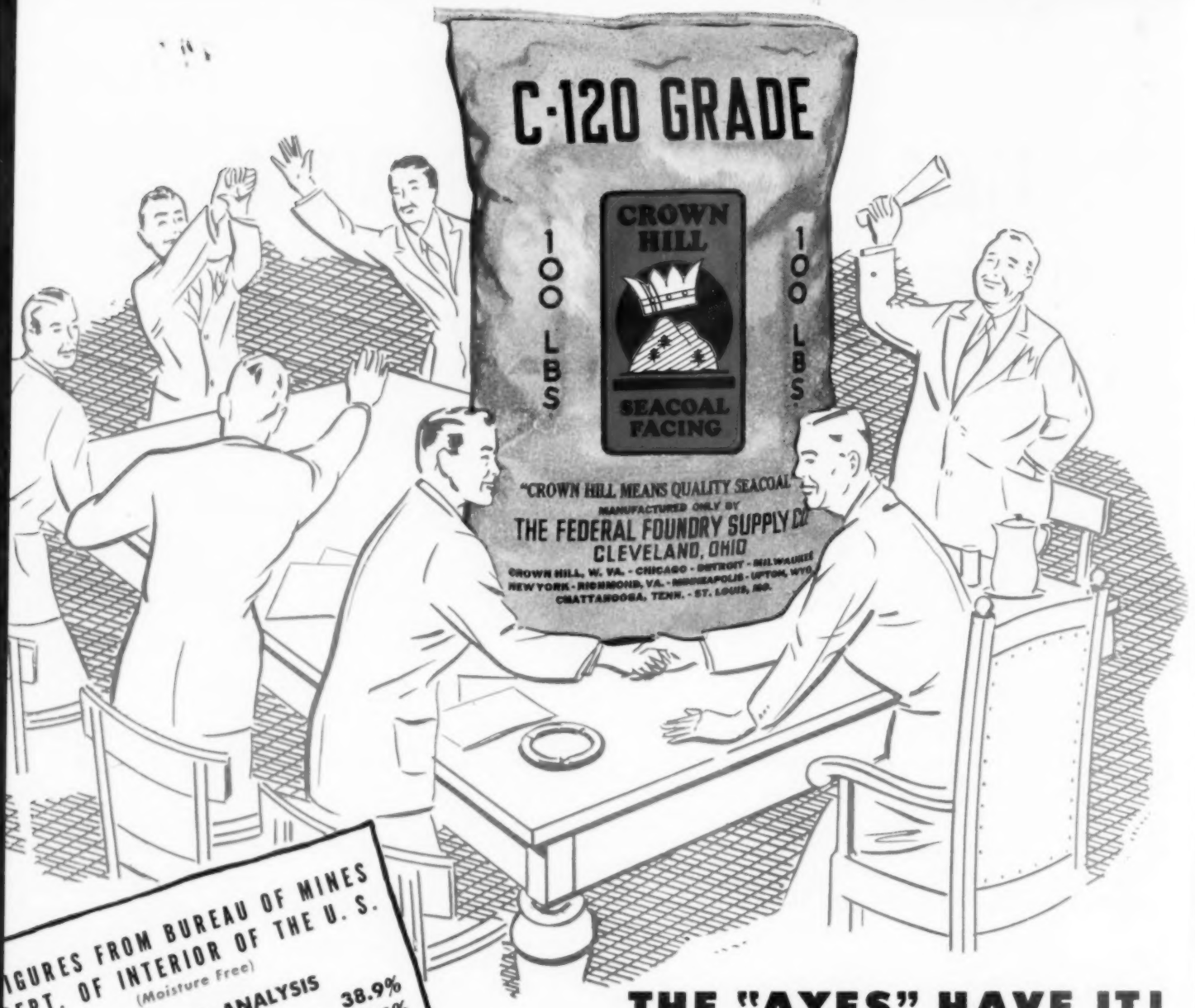
- **Stronger . . . higher yield strength**
- **Less bulk and deadweight**
- **Harder . . . more wear resistant**
- **Better response to heat treatment**
- **Greater shock-resistance**
- **Greater fatigue strength**
- **Less embrittlement at sub-zero temperatures**

INFORMATION AVAILABLE

May we send you a copy of "Nickel Alloy Steel Castings in Industry". This edition, containing information for users, fabricators, engineers, designers and others, is yours for the asking. Write for it today.

EMBLEM OF INCO SERVICE

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.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	100.0%

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	82.0%
	1.6%
	5.6%
Hydrogen	.7%
Carbon	3.7%
Nitrogen	100.0%
Oxygen	
Sulphur	
Ash	
Fusion Point of Ash	2,780° F.

THE "AYES" HAVE IT!

Easy to see why more and more foundries use Crown Hill Seacoal Facing made by Federal. Records prove the advantages. It vents in a flash, eliminates hard spots in castings caused by sulphur pick-up and cuts cleaning costs.

Crown Hill means quality seacoal. Try it! See for yourself why foundries from coast to coast specify Crown Hill Seacoal Facing made by Federal.

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DECEMBER, 1949

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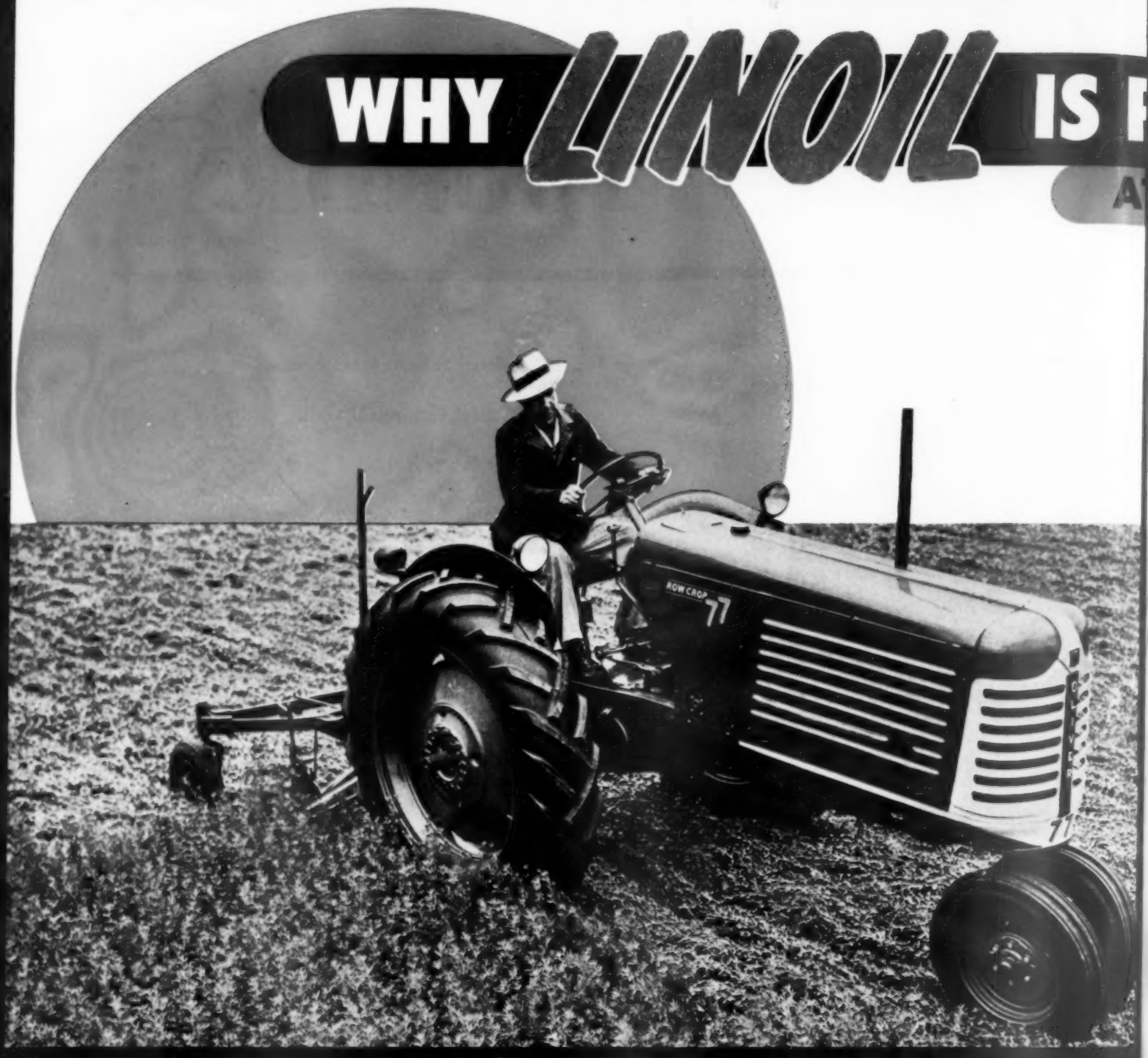
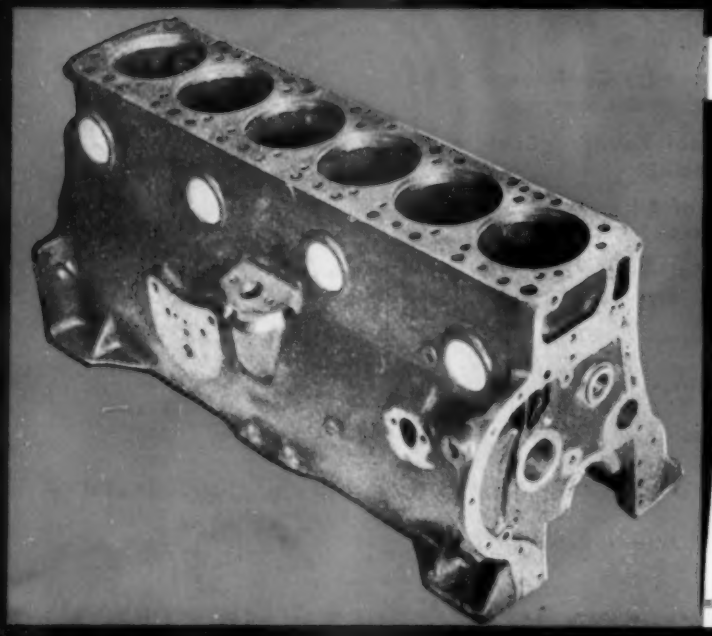
WHY LINOIL IS FR

ATH



An Oliver Row Crop "77" tractor drawing an Oliver No. 22 mower. Powered by a 6 cylinder, valve-in-head gasoline engine, this tractor has six forward and two reverse transmission speeds.



Block and gear case casting for the M. 77 tractor.

S REFERRED FOR TRACTOR CORES

AT THE OLIVER CORPORATION, CHARLES CITY, IOWA

Feeding castings to a high-production tractor assembly line keeps Oliver foundries operating at top speed. In the core-room, a LINOIL core is being rammed or blown every few seconds . . . and each core must strike-off and draw smoothly; leave core-box surfaces clean and ready for the next sand load. LINOIL is not sticky or tacky — reduces to a minimum all costly, non-productive pattern cleaning.

. . . LINOIL WORKS EASILY

Continuous ovens at Oliver are geared for specific time cycles. For example, chunky, 8-inch thick gear case cores must bake in 255 minutes at 420°. LINOIL dries them all evenly, thoroughly, on the first trip through.

. . . LINOIL BAKES RAPIDLY

A steady LINOIL user for over twenty years, Oliver foundries rely on the strict uniformity of their finished cores . . . and rely on the strict uniformity of LINOIL's performance to give them these results.

. . . LINOIL IS DEPENDABLE

THE LINOIL — THE LOGICAL OIL

THE WERNER G. SMITH COMPANY

(DIVISION OF ARCHER-DANIELS-MIDLAND COMPANY)

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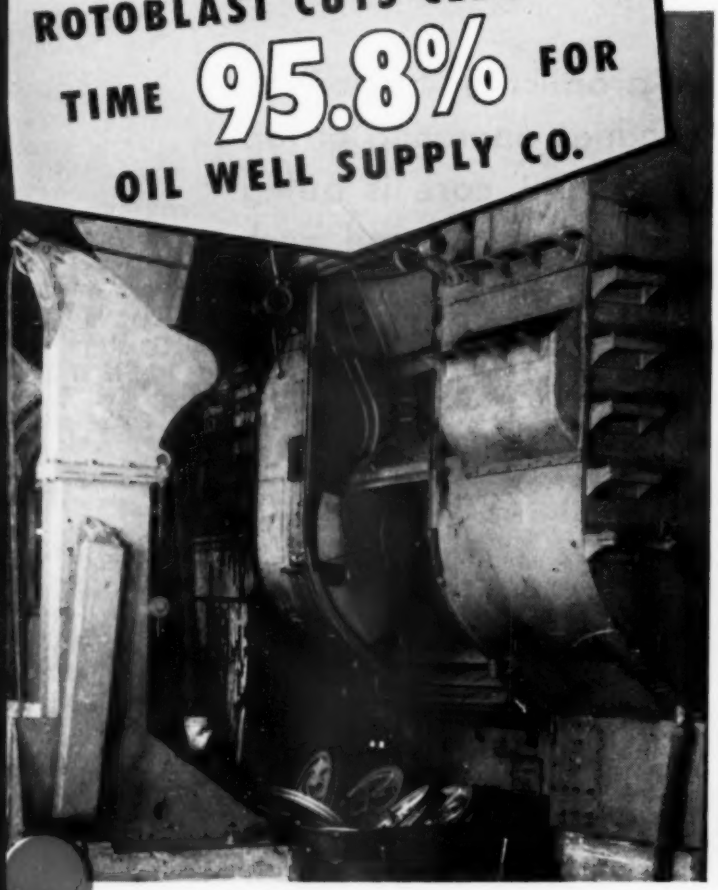
→ Here's how YOU cleaning costs with

ROTOBLAST CUTS CLEANING TIME 95.8% FOR OIL WELL SUPPLY CO.



Pangborn Rotoblast Speeds Cleaning of Castings with Intricate Pockets

In 1948, the Oil Well Supply Co. installed this 21 cubic foot ROTOBLAST Barrel to replace *five* conventional tumbling mills at its Imperial Works in Oil City, Pa. ***The results are amazing!*** The ROTOBLAST Barrel cleans ***two tons*** of medium size castings in ***15 to 20 minutes*** as compared to ***6 to 8 hours*** with the older equipment. That's a saving of 95.8% on cleaning time alone for these castings with intricate shapes and deep pockets.

ROTOBLAST SAVES $5,080 A YEAR FOR YATES AMERICAN MACHINE CO.

This Rotoblast Installation Replaces Five Old-Fashioned Tumbling Mills

Here's how Yates American Machine Co. saves money in their cleaning room: their new ROTOBLAST Team of Table and Barrel (table shown here) cleans small castings ***18 times faster***, large castings ***3.7 times faster***. Actual cash savings add up to ***$5080 on labor alone***. Two men are released for more productive work . . . downtime is virtually eliminated. In addition, five old-fashioned tumbling mills are eliminated!

MORE THAN 25,000 PANGBORN MACHINES SERVING INDUSTRY

Pangborn

* Trademark of Pangborn Corporation

can SLASH blast Pangborn ROTOBLAST

Rotoblast Releases Four Men for Other Work, Cleans Castings from One Pound to One Ton

Harris-Seybold eliminates old-fashioned sand-blasting bottlenecks in their foundry with ROTOBLAST. This new ROTOBLAST room saves *32 man hours a day* . . . cuts cleaning time *66⅔%* . . . saves *$10,160* per year on labor costs alone. Every single casting from one pound to one ton is cleaned by this room. Four men, formerly needed in the cleaning room, have been released by ROTOBLAST for more important work elsewhere in the foundry.

USERS FIND ROTOBLAST SOLVES PROBLEM OF HIGH LABOR COSTS— SAVES MONEY CLEANING LARGE OR SMALL CASTINGS

If you want to save on blast cleaning *and* get a faster, better job . . . modern Pangborn ROTOBLAST is a must for your cleaning room. Whether your foundry needs Barrels, Tables or Table-Rooms you'll find Pangborn has a standard model designed for your requirements.

Pangborn ROTOBLAST *cleans faster* because it throws more abrasive over a larger area with greater density . . . *cleans better* because it gets into small pockets, leaves no abrasive to damage machining equipment . . . *cleans cheaper* because it requires less horsepower, uses less manpower, needs less maintenance, eliminates need for air compressor!

Look to Pangborn for the Latest Developments in Blast Cleaning and Dust Control Equipment

Get the facts!

Find out how much money you can save with Pangborn ROTOBLAST. Bulletin 214 gives full details, technical information. Write for it today without cost or obligation. Address: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland.

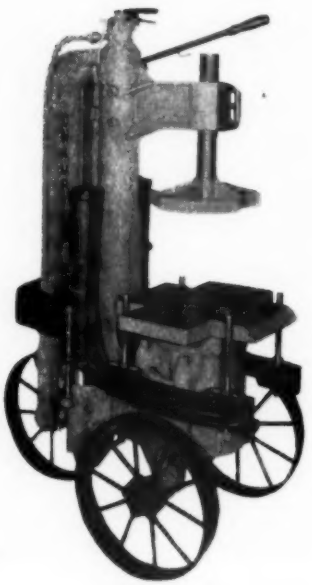
BLAST CLEANS CHEAPER

with the right equipment for every job

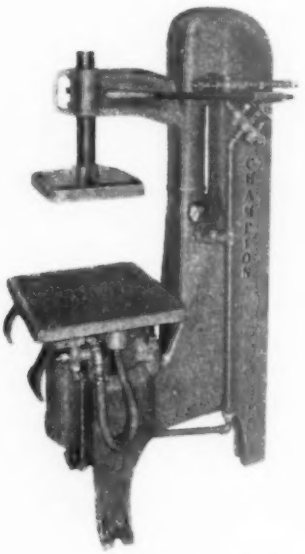
WILL 1950 BE A

Champion Type JS
PORTABLE
JOLT SQUEEZER

Can you beat your achievements of the year just closing, with higher quality, better prices, and operate profitably? "Better castings at less cost" remains the challenge to the industry. You can meet this in the period ahead, as in the year passing, with Champion equipment, designed and built to supply the precision, speed and ease of control that spell efficiency and economy.

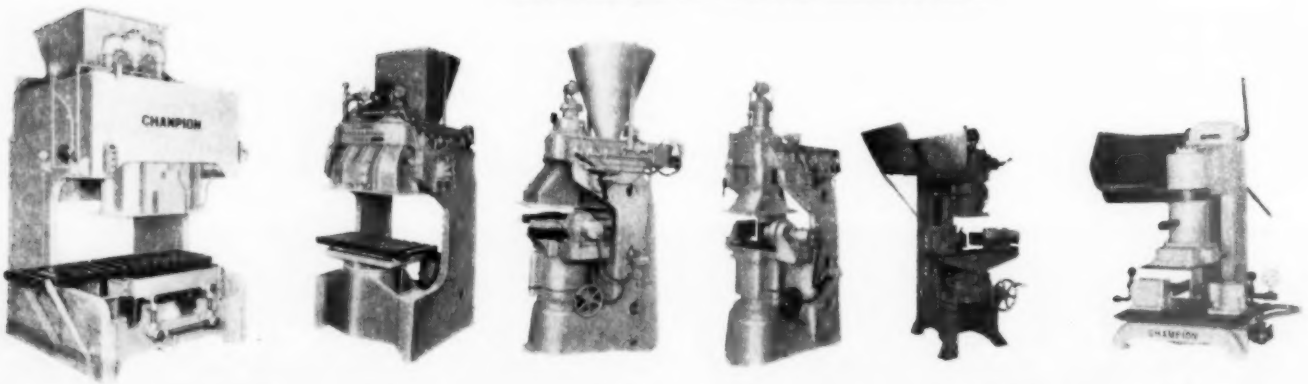


Champion Type JSL
JOLT SQUEEZER
PIN LIFT



Champion Type JS
STATIONARY
JOLT SQUEEZER

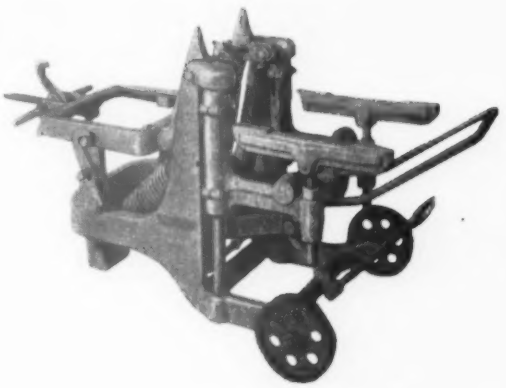
CHAMPION CORE BLOWERS



CB-400 CB-18 CB-15 CB-12 CB-10 CB-5

Champion YEAR FOR YOU?

This is a good time to give your entire production set-up a thorough checking over. Let Champion engineers and production specialists give you the benefit of their long experience in helping you apply Champion machines and the "Champion Method" to your specific problems. Champion Molding Machines and Core Blowers have the high productive capacity, the precision and easy operation that have made them favorites in the leading foundries, all over the world.



Champion Type W
HAND RAM, ROLLOVER AND DRAW MACHINE

Champion Type JM
POWER JOLT, HAND ROLLOVER AND DRAW MACHINE

There's a place in any up-to-date foundry for Champion equipment. Let us show you what these efficient machines can do for you.

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Do not confuse DELTA PERMI-BOND with other sand additives or so-called "chemical sand-coating" cure-alls which may consist mainly of asphalt, or other petroleum by-product pitches dissolved in fuel oil or other solvents. DELTA PERMI-BOND is a scientific development protected by United States patents allowed.

*Licensed for foundry use under U. S. Patent 2256832.

NINE IMPORTANT ADVANTAGES

1. Always uniform. Manufactured under rigid chemical and physical control.
2. Eliminates ash and free carbon which contaminate your sand.
3. Greatly reduces gas, smoke, soot and dirt in the foundry.
4. Provides correct amount of vapor gas in the mold cavity which allows use of lower permeability sand without casting blows.
5. Increases dry strength properties of sand.
6. Prevents scabbing, buckling, rat-tailing and cutting, greatly reducing scrap castings.
7. Improves casting finish . . . cuts cleaning room costs to a minimum.
8. More economical to use: cuts sand costs.
9. Much cleaner, more foolproof than seacoal.

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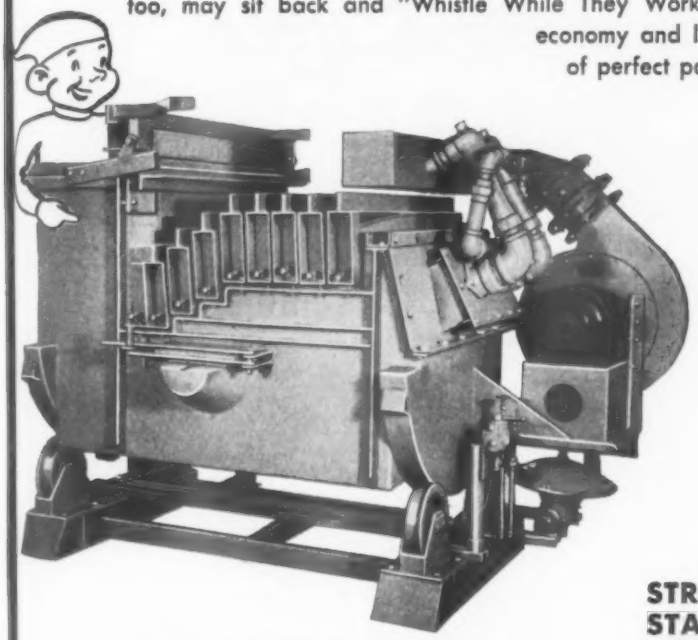
MILWAUKEE 9, WISCONSIN

you can whistle . . . while THEY work!

Here are a few furnaces that are now being used by many of the leading organizations in the foundry, die casting and permanent mold industries throughout this country of ours. They have done their respective jobs well! The fact is, when you install a Stroman Furnace for any non-ferrous metal melting job, you too, may sit back and "Whistle While They Work," for their efficiency, economy and longevity are your assurance of perfect pours, every time, at lowest costs.



STROMAN CRUCIBLE STATIONARY MELTING FURNACES

For Brass, Bronze, Aluminum and other non-ferrous metals. Sturdy, efficient and featuring the Stroman Push-Back Cover these stationary furnaces are designed for peak production and greatest fuel economy. Oil or Gas Fire. Capacities from No. 20 to No. 400 crucible.

ECONOMELT FURNACES

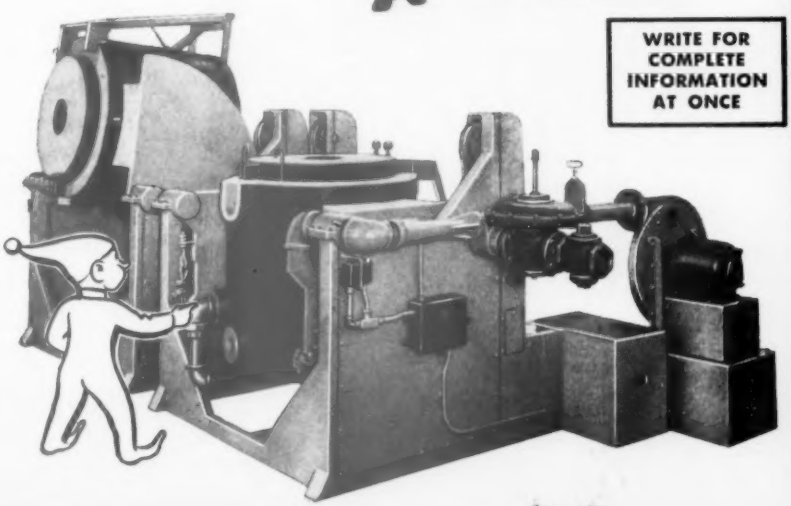
The Best Direct Fired Reverberatory Melting Furnace on the market! Its speed in melting Brass, Bronze, Grey Iron or Aluminum is unmatched! Continuous charging . . . with cold metal never reaching the molten bath, makes it practically a continuous pour furnace . . . and it will show upwards of 40% in fuel cost savings. Oil or gas fire. Also can be furnished with combination oil, gas burner. Capacities (Brass) up to 2000 lbs. Write for Bulletin No. 635 for full information.

STROMAN IRON POT STATIONARY MELTING FURNACES

These furnaces are highly recommended as break down furnaces for zinc die casting plants. They also excel as aluminum holding furnaces. They can be supplied with or without hoods to exhaust fumes and heat. Their construction assures longest pot life and lowest fuel costs. Choice of manual or automatic controls and gas or oil fire. Capacities from 212 to 14,000 lbs. of zinc.

WRITE FOR COMPLETE INFORMATION AT ONCE

STROMAN MECHANICAL OR HYDRAULIC TILT CRUCIBLE MELTING FURNACES



For Brass, Bronze, Aluminum and other non-ferrous metals. Stationary Lip Pour assures a constant pouring arc, eliminating the necessity of moving the ladle at any time during a pour. They are excellent for use in permanent mold and die casting plants as well as any foundry. Their sturdy construction assures longest life, and their economical operation results in lowest production costs. Oil or gas fire. Built in sizes to handle capacities from No. 125 to No. 400 crucible.

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

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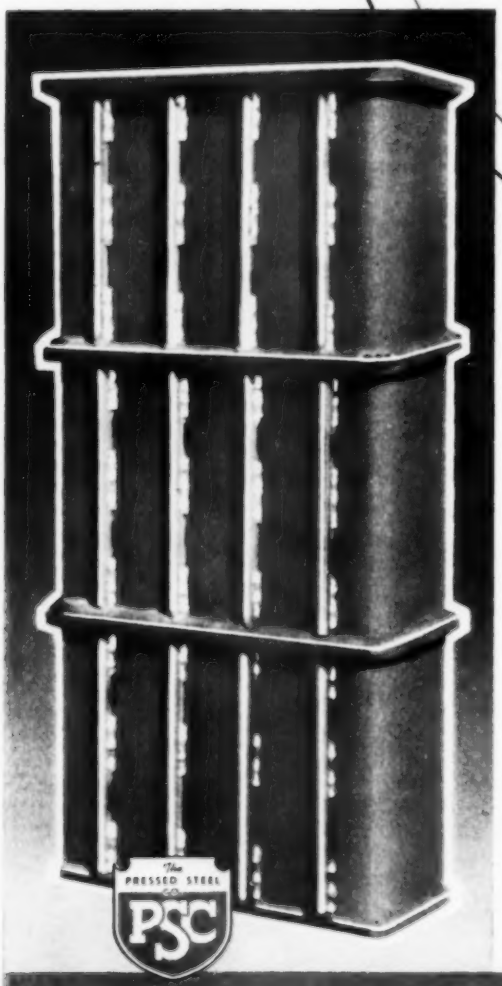
Shortened Furnace Cycle
5 HOURS



Another "PSC" Production Saving

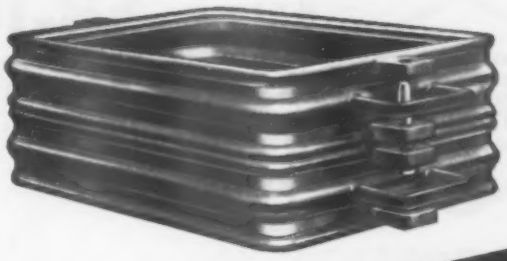
The PSC annealing box at left is another example of how we are helping our customers in these days of mounting competition. This 3-tier unit for continuous malleablizing (no bottom in center box) cut 5 hours from one customer's furnace cycle, due to its 2/3 lighter weight and faster handling. For another customer these much less bulky units increased furnace capacity and eliminated the need of enlarging their heat-treating department. Another installation so substantially increased operating efficiency that all 34 furnaces in the plant were equipped.

As pioneers of light-weight sheet alloy heat-treating containers and covers, Pressed Steel Co. furnishes units for every product — in any size, design or metal specification. Let us help you cut costs. Send blue prints or write as to your needs.

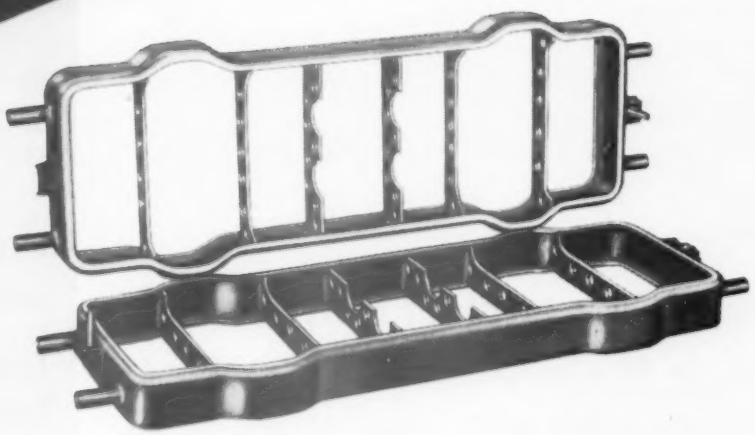
THE PRESSED STEEL COMPANY
of WILKES-BARRE, PENNSYLVANIA

Industrial Equipment of Heat and Corrosion Resistant WEIGHT-SAVING *Sheet Alloys*

☆ ☆ ☆ OFFICES IN PRINCIPAL CITIES ☆ ☆ ☆



Double Check and Triple Check



In the Shanafelt plant every detail of your Flask is watched constantly. Your handles are placed exactly where you want them—your pin lugs line up perfectly—your bars are placed and notched just right.

When you receive a Shanafelt Flask it's ready for work—no alterations.

Such results come from a 56 year old manufacturing policy which stresses care, thoroughness, and accuracy. In this plant it's more than "check and double check" — we really "Double check and Triple check". Our long and impressive list of satisfied users proves the soundness of this policy.

When you're ready for new steel Flasks, we'd like to offer our estimates of cost and delivery.

The SHANAFELT Manufacturing Co.

ESTABLISHED 1893

2600-2700 WINFIELD WAY N.E., CANTON, OHIO

Presenting the New CASTFLUX Type SB-10

CASTFLUX
Trade Mark Reg.

An Anti-Piping Compound So Revolutionary in Its Advantages and Accomplishments That Its Use Opens a New Era of Quality Production and Savings for Foundrymen!

With the use of CASTFLUX SB-10 SMOKE and FUME, for the first time, are practically eliminated.

CHURNING under most conditions can now be overcome.

A positive saving in "REMELT" RISER or HOT TOP METAL can now be effected through "SHORT" pouring.

Tests made in the field show this saving varying from 10% to 30% in both IRON and STEEL.

SB-10's outstanding "INSULATING PROPERTIES have established that 25% LESS WEIGHT material is required for effective results in any application.

SB-10 keeps RISER METAL HOT AND LIQUID for periods of 100% to 200% LONGER.

CASTFLUX TYPE SB-10 sells at NO INCREASE in Price.

In The Ladle, FLUIDITY Is Materially Increased PURIFYING the Metal. Castflux Type SB-10

Also Gives You

CLOSER GRAINED CASTINGS, FEWER REJECTS, FEWER MISS RUNS, LESS REMELTING, LONGER LADLE LIFE, LESS LADLE CHIPPING

at a cost of

10c to 15c

per ton of metal treated

It took 5 years of development and research to perfect SB-10.

Foundrymen, in whose plants SB-10 has been tested for months consider it the most efficient anti-piping compound on the market. It is sold with this

UNCONDITIONAL GUARANTEE

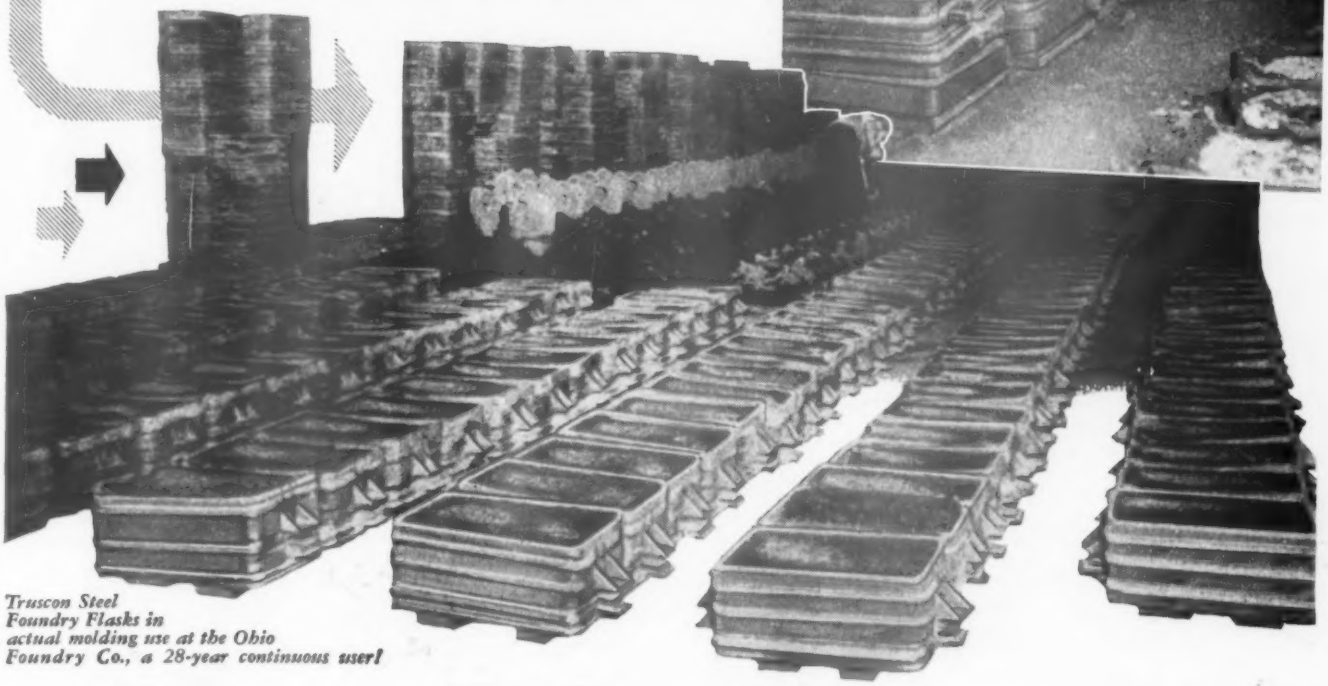
Unless Castflux Type SB-10 meets with your full approval material can be returned, provided we are notified within 30 days after receipt of material.

Write for Complete Details and Prices

NATIONAL PIGMENT CO.

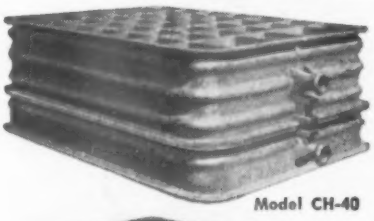
2115-2117 EAST YORK STREET, PHILADELPHIA 25, PENNA.

Ohio Foundry Co., Cleveland, Ohio
— a 28 year continuous user of Truscon Steel Foundry Flasks !



Truscon Steel Foundry Flasks in actual molding use at the Ohio Foundry Co., a 28-year continuous user!

Model OM-1



Model CH-40

Model TM-10

For 56 years, The Ohio Foundry Company has been a big producer of light, medium, and heavy grey iron and semi-steel alloy castings. Truscon Steel Foundry Flasks have served this company for 28 years, during peace and war, helping to establish production and performance records of high efficiency.

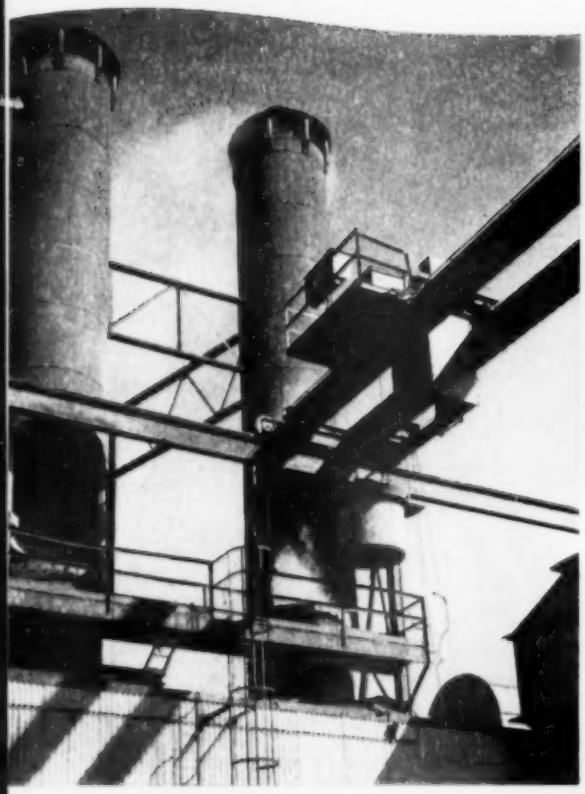
Service records such as this are common for Truscon Steel Flasks. Truscon's long experience in flask design . . . Truscon's great facilities for flask production and service . . . Truscon's long association with flask users in every branch of the foundry industry . . . all these give Truscon the products and prestige to assure you exceptional flask service.

Truscon manufactures one-man, two-man and power handled steel flasks to meet your own particular production requirements. Write for catalog showing wide range of Truscon Steel Flasks available, and ask for an experienced Truscon foundry man to help plan your needs efficiently.

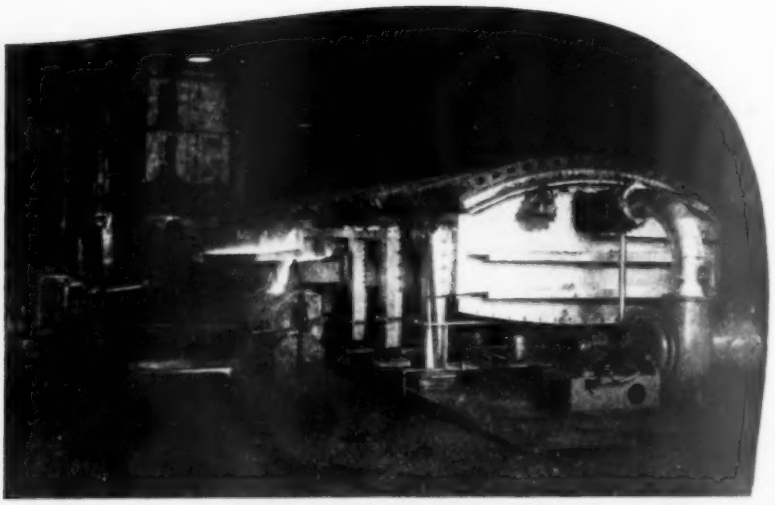
TRUSCON STEEL COMPANY

PRESSED STEEL DIVISION
6202 Truscon Avenue, Cleveland 4, Ohio
Subsidiary of Republic Steel Corporation

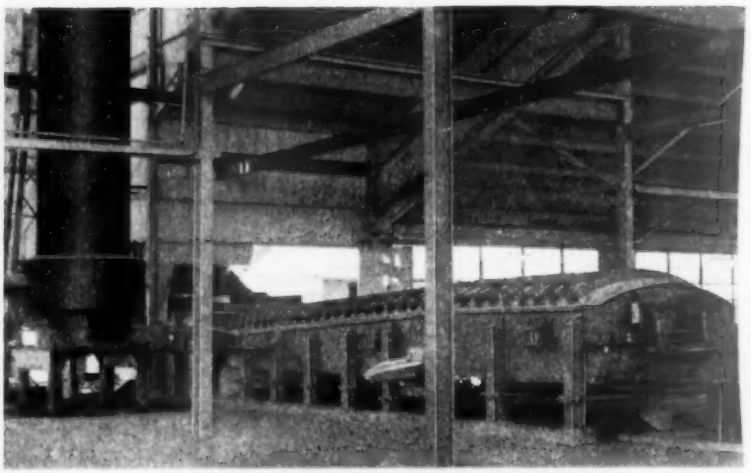
Do you make gray iron?



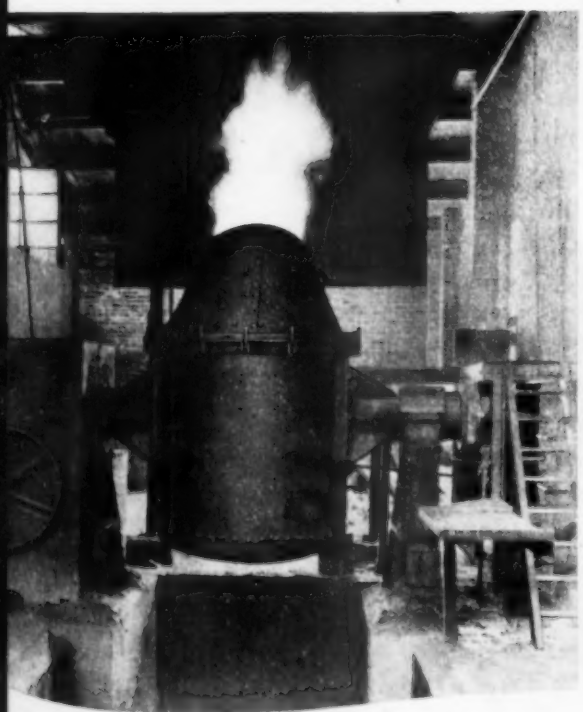
WHITING CUPOLAS



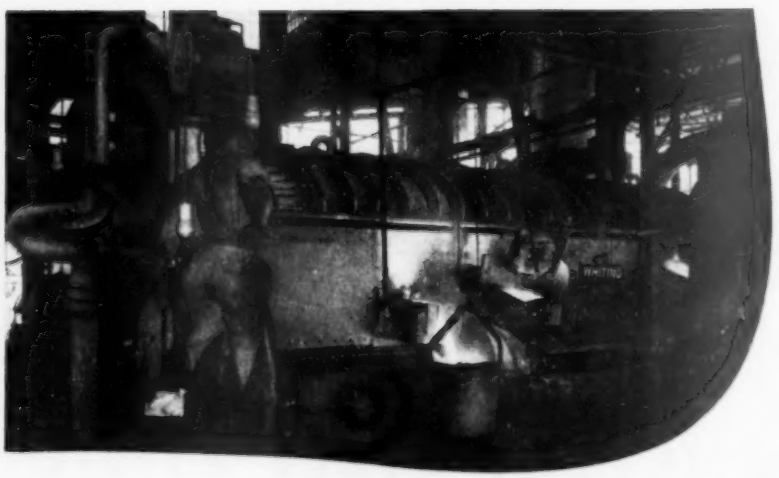
WHITING AIR FURNACE



WHITING DUPLEXING SYSTEM



WHITING SIDE-BLOW CONVERTER



WHITING CRADLE FURNACE

...malleable?...steel?

Let Whiting engineering "know-how" and experience help you get hotter, more uniform metal at lower cost

. . . also better castings, reduced spoilage, and smoother operation.

If you are following the methods of several years ago, it will pay you to re-examine your melting practices and ask Whiting for counsel and recommendations.

Whiting's *complete line* of successful melting equipment assures you that our recommendations are unbiased because we are able to supply any type best suited to your conditions. Write and ask to have a Whiting engineering representative call on you.

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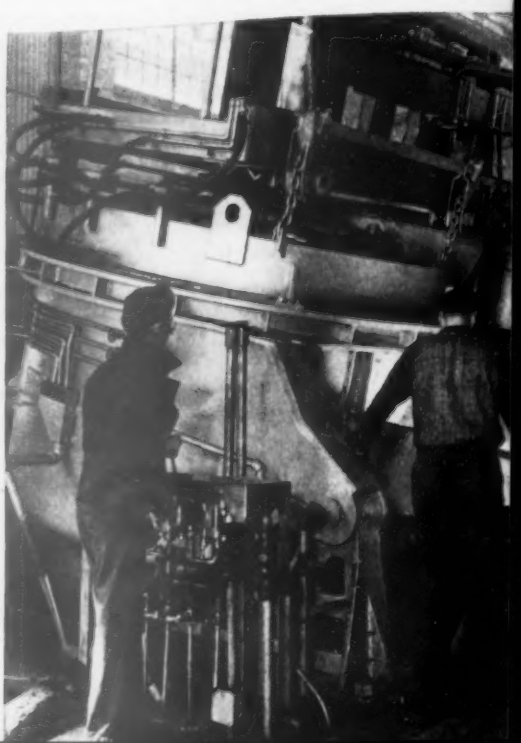
15607 Lathrop Avenue, Harvey, Illinois

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.

WHITING HEATED METAL MIXER



WHITING HYDRO-ARC ELECTRIC FURNACE

LET'S KICK IT AROUND

By Tom Barlow

Right today and wrong tomorrow,
Hear the foundry song of sorrow.
If not too wrong you still may be all right,
But too wrong now may be all wrong tonight.

—Apologies to everybody

Sand is our bread and butter (horrible diet, isn't it?), so people sometimes assume we know something about it. In fact, about 30 years ago we pioneered synthetic sand binders. Of course, "we" means Eastern Clay Products, not me. Let's see—30 years ago . . . . hm . . . . oh, yes! 30 years ago I was still studying—the cutest blonde in the entire 5th grade.

Anyhow, to get on with the story, a short time ago I ran into an old problem in a new suit. (Maybe I should say—in a new dress—on the assumption that the noun "trouble" is female.) The man asked, "How wrong can our sand be and still be right?" At first this sounded like a gag, but, you know, that really was a pretty good question. Furthermore, the same problem comes up in many or all phases of foundry practice.

Sometimes it seems cheaper to compromise slightly with what the book says. Maybe we find that we can do things a little wrong and still get by. But where is the limit? . . . Take a problem I saw. A casting had been made successfully for a number of months in spite of the fact that the sand distribution was not strictly "by the book" and the gates were strictly from hunger. Both the sand and the gates were wrong according to accepted practice, but the castings were good.

Suddenly—it rained scrap.

Something was just a little too wrong!

Since both the gates and the sand were known to be wrong, the obvious first step was to fix the gates, because you can change gates quicker than you can change sand. Also, there was no reason for the gate being wrong, while there was some excuse for the sand. It was wrong because the core sand did not match the molding sand in distribution. It was that way in an attempt to save money in the core room—and perhaps if the gates had been more nearly correct, the foundry could have gotten away with it. But the real point is,—*How many of us realize that the core room may control our molding units?* Do you realize how important it is to see that these two departments are properly coordinated?

Let us take another familiar example. Let's look just very quickly (this subject is dynamite) at the "3-screen" sand man versus the "spread" sand man (some of them are only a little spread). They can't both be right and yet both make good castings. One of them must be wrong, but why are his castings good? Do you suppose that neither one quite practices what he preaches? (No offense, boys—stick around and I'll explain.) If there is any core sand dilution, the actual screen analyses will be a composite of the core sand and the molding sand—unless the two sands are the same. How many foundries actually blend their core sand and molding sand to obtain a "book" distribution?

Most blends are pretty accidental, and the result is that the sand actually used may not really meet the claims of either "theory" of distribution. If *either* theory is right, then most sands used are little wrong. If they are a little wrong—O. K. But if they get too wrong—look out. You may suddenly find yourself in trouble that would make dentist's drilling seem like a picnic.

Now for the moral:

The difference between a little wrong and too wrong is very slight. What may be just a little wrong this morning may be all wrong tonight. A sand may have one peak on the 40-screen and another on the 100-screen. We know that two peaks are wrong, but the foundry may get by and even say that there is nothing wrong with the sand. But if that peak on the 40-screen keeps growing and growing because of core sand dilution, it may, over night, start to cause scrap. Just where the sand will change from a little wrong to "too wrong" will depend on gating, metal temperatures, etc. If you are even a little wrong, be careful of innocent-appearing changes in the core room sand or some other factor which may indirectly change the molding sand, or you may find your castings are "just a little bit scrap".

And in these days, with production experts more allergic to costs than ever before, you simply can't afford an extravagance like that.

★ ★ ★

EASTERN CLAY PRODUCTS, Inc.

"Bonding clays sold with service"

JACKSON, OHIO

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HILLS-McCANNA COMPANY, CHICAGO

MEMBER

This Foundry Is A Good Place To Work

FOUNDERS of non-ferrous alloys since 1870, this plant enjoys an enviable reputation for the production of quality magnesium castings. Complete facilities make it a good place to work: Castings are poured on a conveyor line, each ladle being checked for correct temperatures; elaborate materials handling facilities include large cars for shuttling flasks to shakeout stations, continuous overhead sand handling equipment, core racks, and castings cleaning equipment.

Skilled technicians are employed to maintain strict metallographic and physical laboratory control over all phases of production. A complete X-Ray department is in daily use. Grinding and pickling, heat treating, and machine shop departments complete the plant facilities.

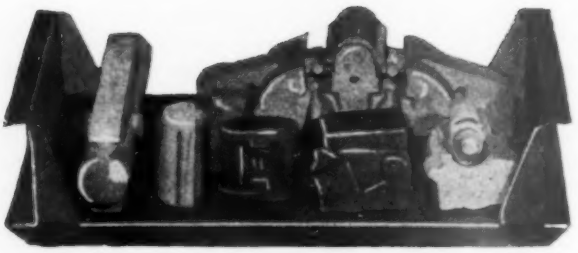
Good housekeeping practice, good personnel relations, good management, are additional factors that make this plant a good place to work.

The 1500 lb. capacity Herman rollover machine illustrated is typical of a battery that are used at this plant. These and all Hermans require little training to operate. One rotary valve controls all operations. Patented rollover action provides a complete 180° rollover with power applied on only 90° of the roll!

May we show you how all Hermans have made their way by the way they're made?

Herman **MOLDING MACHINES**

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.



Use ONE Tray For All THREE Jobs:

1. Baking Cores 2. Stacking Cores 3. Carrying Cores

Foundries interested in reducing handling costs are standardizing on CMD Core Trays. They eliminate transferring cores from core plate to core tray. When used for core baking, they decrease baking time—for the heat radiates to the bottom of the core quickly and thus gives uniform core baking.

The convenient lock-stacking features permit storage from the floor up. Bins and racks are no longer necessary. CMD Core Trays are available with either inside or outside gussets. Order CMD Core Trays today. Also ask for catalog of complete line of CMD Foundry Specialties—the result of 25 years experience in designing and making equipment and supplies for the foundry industry.

SPECIFICATIONS

SIZE—12" x 24"
LOADING HEIGHT—4½"—6" or 7"
OVERALL HEIGHT—5½"—7" or 8"
WEIGHT—9½ POUNDS
MATERIAL—16 GA. SHEET METAL
SPOT WELDED (28 POINTS)
ALL ROUNDED CORNERS
2 BOTTOM REINFORCEMENT ANGLES
CONSTRUCTED FOR STACKING

CMD

Tri-Purpose CORE TRAYS

CHICAGO MANUFACTURING & DISTRIBUTING CO.

Dept. 12F, 1928 West 46th St. Chicago 9, Illinois

AIRCO HARDFACING ALLOYS

add 2 to 25 times *LONGER SERVICE LIFE* to new and worn parts

SEVERE ABRASION

Pug mill knives, coke crusher rolls, mill guides and similar equipment, when hardfaced with Aircolite last many times longer, and at the same time give superior operating efficiency. For *extreme earth abrasion*, Airco Tungtube (tungsten carbide) is recommended.

IMPACT

Parts subjected to impact, like bucket lips, last longer when hardfaced with Airco Electric Self Hardening Alloy. Furthermore, parts can be rebuilt with this alloy at a fraction of new part cost. For *shattering impact*, Airco No. 388 is recommended.

HEAT and CORROSION

Aircoloy 1 and 6 effectively resist wear caused by heat and corrosion . . . for example, parts subject to intense heat, such as ingot tong bits, exhaust valves and seats, tap hole augers, and hot punches, last from 2 to 25 times longer when protected with these NEW Airco Hardfacing Alloys.

BUT TRY A FEW OF THESE NEW AIRCO HARDFACING ALLOYS YOURSELF . . . TAKE ADVANTAGE OF THE SPECIAL INTRODUCTORY LOW PRICE OFFER!

For Only $2.95 you receive a trial assortment of *Aircolite* (for oxy-acetylene and electric application) and Airco Electric Self Hardening Alloys, plus instruction sheets for each of these two alloys and a booklet describing the complete line of Airco Hardfacing Alloys.

Since this special price is good for a limited time only, we suggest that you fill in and mail the coupon below . . . NOW! Send it to our nearest office or authorized dealer. On West Coast: Air Reduction Pacific Company. Represented Internationally by Airco Corporation (International).

Mail this coupon today for your Special Assortment of the NEW AIRCO HARDFACING ALLOYS

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Air Reduction, 60 East 42nd Street, New York 17, N. Y.

- ☐ Here is my check for $2.95 — send me the special package of Airco's Hardfacing Alloys.
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AO Dust Goggle

Thanks to this AO DUST GOGGLE

eyes are protected, efficiency increased in mines and foundries everywhere!

Where fine dust particles and powder are a hazard and irritation, the AO 302A Dust Goggle has long proved its value. Protects against impact of flying particles coming from any direction as well as dusts. Highly recommended for foundry and mine work, cement plants and compressed air operations. Your AO Safety Products Representative can supply you.

Quick Facts

- 100 mesh special wire screen, on inside of side shields prevents entry of dust and fine particles.
- *Individual* eyecups shaped to fit contour of each eye with smooth, rounded edges. Low set for wide angle vision. Won't conduct heat or electricity. Numerous perforations provide air circulation to prevent fogging of lenses.
- Solid fibre retaining rings.
- Quickly adjusted ball-chain bridge—insulated and curved for snug, comfortable fit.
- One-piece, easily adjustable rubber headband.
- Choice of 50 mm. Super Armorplate or 6 Curve Super Armorplate clear or Calobar lenses in medium, dark or extra dark shades.
- Rubber cushions around edge of eyecups available at slight extra cost.

American Optical
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For Melting Non-ferrous Metals In Any Furnace--

--NORTON Refractory Cements

For melting all non-ferrous metals — in high frequency and induction furnaces, pit furnaces, direct arc type rocking furnaces — Norton Company offers a complete line of high temperature cements and prefired shapes. **Fused magnesia cements** for lining Ajax-Northrup high frequency furnaces melting nickel-chromium alloys; **silicon carbide mixtures** for ramming into oil or gas fired reverberatory and pit furnaces melting aluminum, copper and zinc; **fused alumina cements** for lining burner tunnels in gas or oil fired billet heating, heat treating and annealing furnaces; **fused magnesia cement** for rammed linings in Ajax-Wyatt low frequency vertical ring induction furnaces melting high copper alloys, and cupro-nickel, nickel-silver and cadmium-bronze alloys.

NORTON REFRACTORIES®

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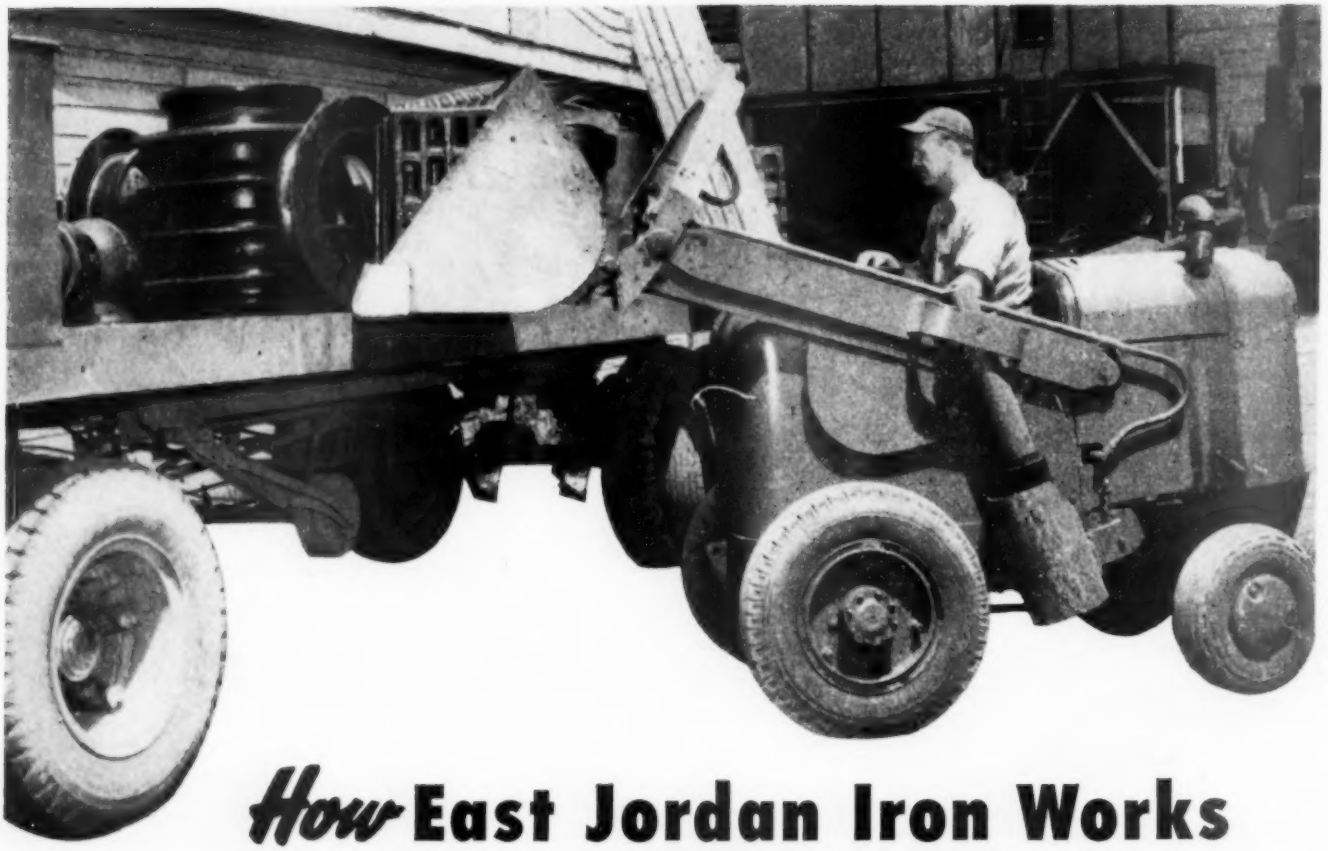
WORCESTER 6, MASSACHUSETTS



How East Jordan Iron Works *Profits* with 3 PAYLOADERS

THE PROBLEM:

This foundry and metal working plant has to unload sand from cars and move it through all phases of foundry operations . . . dispose of old cores, carry castings from molding floor to cleaning room, to machine shop, to storage . . . move products from storage to docks and load them onto trucks and cars.

THE SOLUTION:

This company acquired its first payloader in 1947. "Today we have three units—all of them constantly busy and producing unexpected economies regularly," declares a company official. "One by one our basic problems have disappeared."

Handle Sand, Castings, Cores. The Payloaders unload incoming sand from cars. They perform all nightly clean-up operations including the complete handling of sand, castings and cores. In the daytime one Payloader feeds the muller and keeps all molding stations supplied with sand.

Investment Quickly Repaid. Payloaders also solved a difficult shipping problem. They pick up, carry and load finished castings from storage directly onto trucks thus avoiding delays, the construction of large expensive docks and the need for an extra crew of men. These Payloaders also remove snow, handle drums of molding bond, gasoline, etc., unload patterns from trucks and do many other money-saving jobs.

Thousands of other foundries and plants are using Payloaders with profit. Learn how they can save time, labor and money in your plant. Write The Frank G. Hough Co., 703 Sunnyside Avenue, Libertyville, Illinois.

GET YOUR COPY of Job Study No. 14. It's a complete authorized analysis of the performance of Payloaders at East Jordan Iron Works, East Jordan, Michigan.

HOUGH

PAYLOADER

Manufactured by THE FRANK G. HOUGH CO.

TO HELP YOU PRODUCE

High-Quality Iron

FREE BOOKLET TELLS
HOW CUPOLA ADDITIONS OF ALLOYS
IMPROVE FOUNDRY PRACTICE

This new booklet describes in detail:

- How ferro-alloys control the composition of iron and compensate for variations in raw materials.
- The beneficial effects of silicon, manganese, and chromium in cast iron.
- Advantages in using ferro alloy briquets.
- How to calculate the number of briquets to add to the charge.
- How to control carbon, sulphur, and phosphorus.
- Typical cupola charges for soft gray iron, high-strength iron, and low-chromium iron.

24 pages, including tables showing standard cupola charges and iron composition. A real help to all foundrymen.

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Please send me, without obligation, a copy of "Briquetted Alloys for the Iron Foundry Industry."

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Company .....
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PROOF OF SERVICE!

. . . serves to prove Federated First in the Non-Ferrous Field.

Each one of the ads above highlights a case in which the stamp "SERVICED BY FEDERATED METALS" means that a foundry was helped to cast a better product. And better products mean more customers!

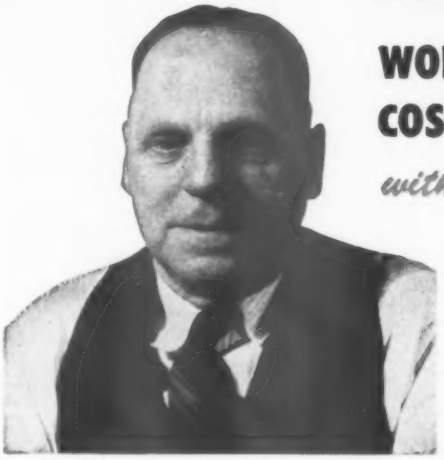
This same service . . . in the person of experienced field and research metallurgists . . . is yours for the asking when you buy from Federated. See Federated first for all non-ferrous metals and alloys.

Federated first in the non-ferrous field AMD

Federated METALS DIVISION

AMERICAN SMELTING AND REFINING COMPANY, 120 BROADWAY, NEW YORK 5, N.Y.

HERE'S HOW...



WOLVERINE BRASS WORKS REDUCES MAINTENANCE COSTS 80% — METAL LOSS TO 1%!

with LINDBERG-Fisher Tilting Furnaces!

Wolverine Brass Works, Grand Rapids, Michigan, prominent manufacturer of plumbing goods reports maintenance costs reduced 80%. Wolverine Brass installed Lindberg-Fisher Tilting Crucible Furnaces in their melting and pouring departments—they have operated these furnaces 9 hours a day, 5 days a week for 8 years. Their experiences show cleaner operation, increased safety, lower production costs, and greatly reduced maintenance costs and metal loss.

Mr. Fred H. Papke, Foundry Supt. says: "We like the Lindberg-Fisher furnaces because we can equip them with hoods in back and front, protecting the men from the smoke of the zinc fumes. Overflow or spillage metal is caught in easily cleaned basins and recovered at the end of each day. Lindberg-Fisher furnaces are easy to reline, and insert crucibles. Furnace covers move back and forth for easy repair. In my foundry experience on non-ferrous metal, I find the Lindberg-Fisher furnaces economical and highly efficient."

HERE'S HOW:

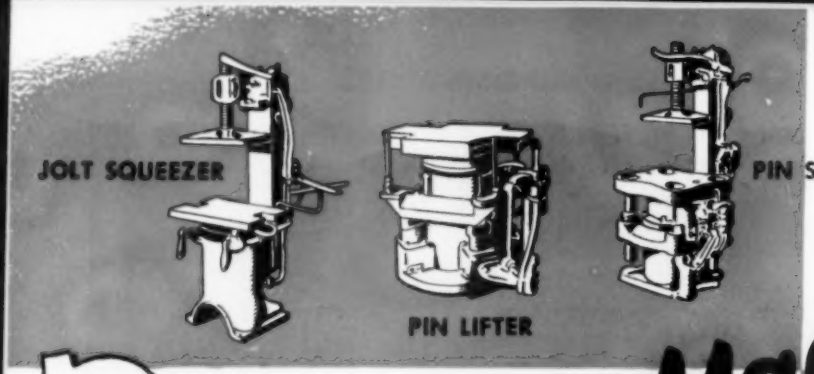
Equipment	12 Lindberg-Fisher Tilting Furnaces
Heats per day	7.0 heats per furnace
Lbs. per heat	606
Crucible life	131.5 heats per crucible
Metal loss	1% of total production

For full details call your local Lindberg-Fisher representative or write for Bulletin No. 57-A.

Fisher Furnaces

A DIVISION OF LINDBERG ENGINEERING CO.

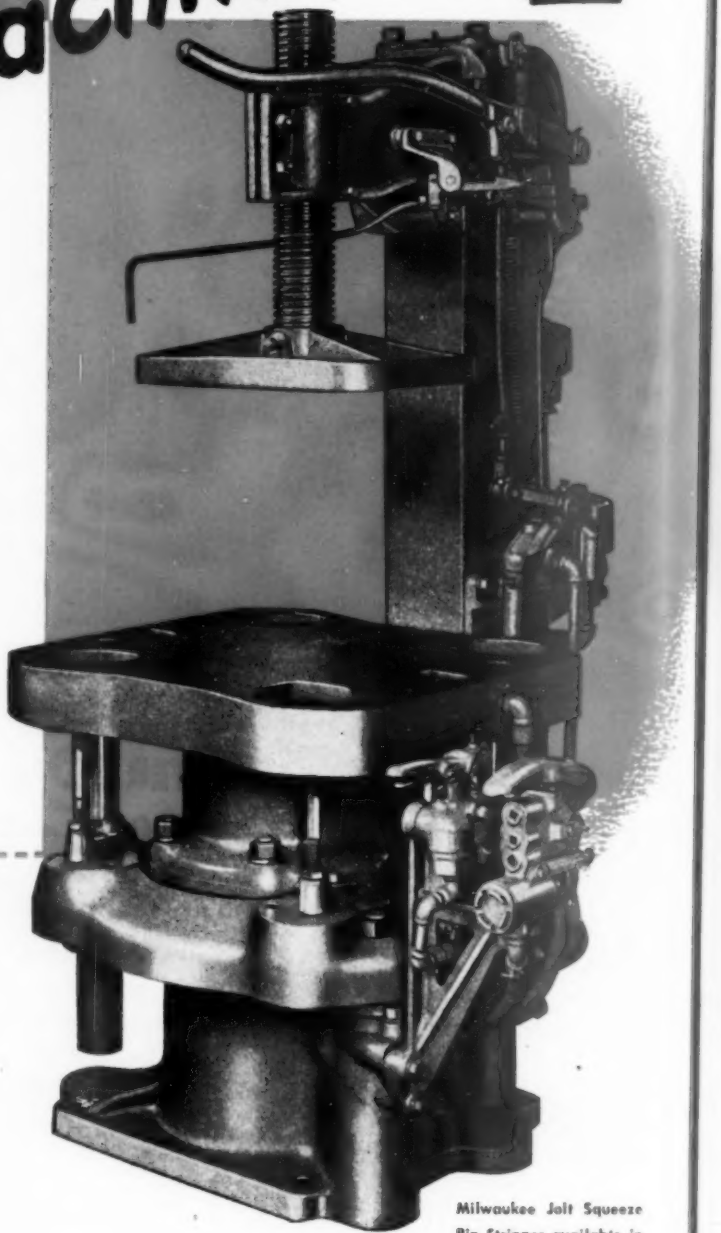
2453 West Hubbard Street, Chicago 12, Illinois



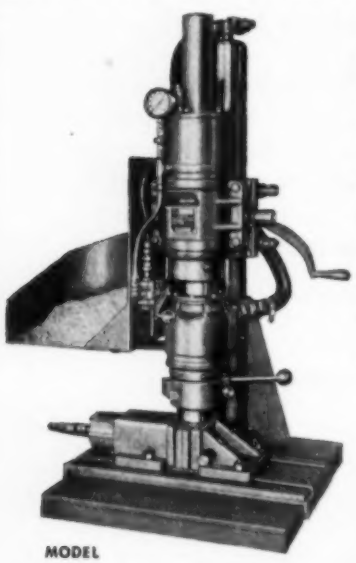
3 Molding Machines in 1

Here's a molding machine that's really versatile. The Milwaukee Jolt Squeeze Pin Stripper operates as a Jolt Squeezer . . . Pin Lifter . . . or Pin Stripper. It's like having three molding machines in one.

The drawing mechanism can be operated on the exhaust of the squeezing stroke as a Stripper, or as a separate operation after squeezing as a Pin Lift. The machine handles simple, inexpensive pattern equipment, enabling you to put troublesome short-run jobs on fast production schedules. It is machined to close tolerances and is accessible from all three sides. Write for complete information on this modern, versatile "Triple Threat" molding machine. 5 sizes available. Ask for Bulletin No. 110.



Milwaukee Jolt Squeeze Pin Stripper available in 5 sizes.



MODEL NO. 3A

30% More Blow Pressure with Milwaukee-Taccone Bench Style Core Blower

This modern, bench style machine blows intricate cores up to 4 lbs. in weight. Synchronized clamping and blowing increase speed and efficiency. Blown cores automatically released, can be removed as fast as blown. Blower steps 90 lb. line pressure up to 120 lbs. blowing pressure. Also heavy duty Core Blower with 100% more blow pressure. Ask for Bulletin No. 119A.

Piston Size Calculator

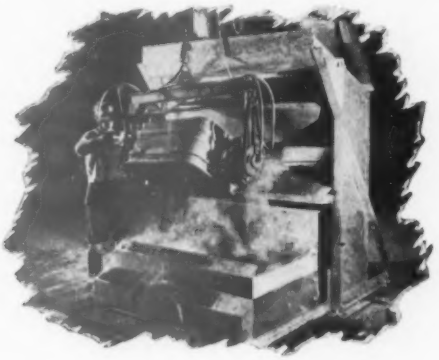
Milwaukee Foundry Equipment Engineers have devised this handy calculator for determining the uniform mold hardness and size of squeeze piston. It's FREE! Send for your Calculator — today!

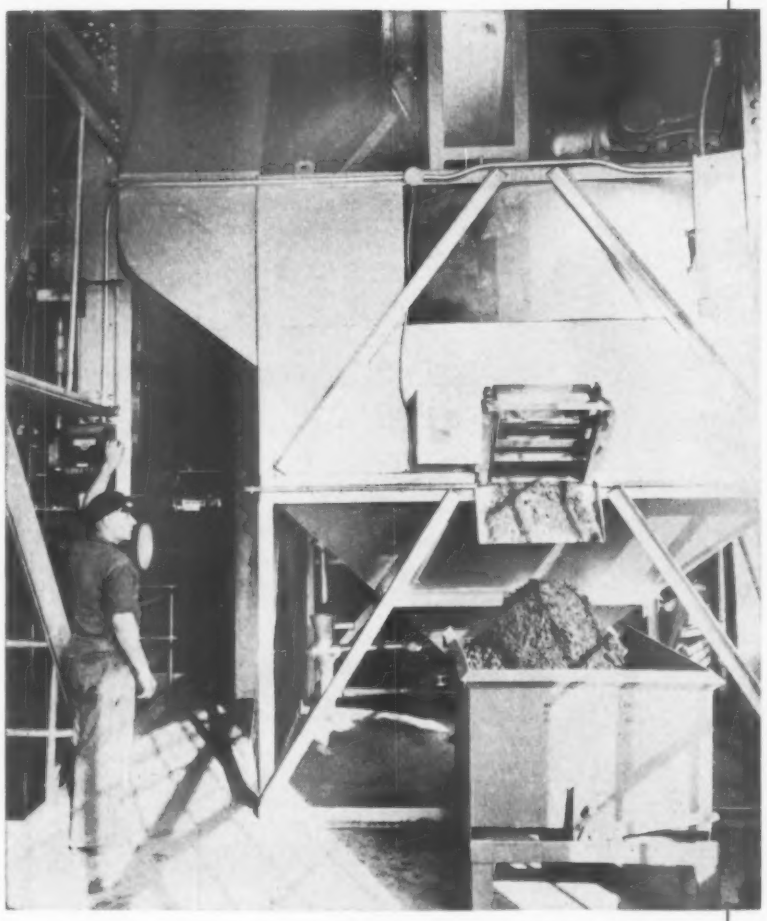
CORE BLOWERS • CORE GRINDERS • MOLDING MACHINES • BRIQUETTING PRESSES

MILWAUKEE Foundry Equipment Co.

3236 W. PIERCE STREET, MILWAUKEE 15, WISCONSIN, U.S.A.

The sludge tells the story of ROTO-CLONE'S efficient dust control





• *Fine dust collected by Type W Roto-Clone from shakeout is discharged as a mud-like sludge for easy disposal.*

• *Bulletin No. 274-A—gives the complete story about Type W Roto-Clone design and operation. It's free—write for a copy now!*

MINUTES ago the sludge shown at left consisted of millions of free fine dust particles of small micron size. They were released during the operation of the Link Belt 3x5 Shakeout pictured above. But before this dust could foul up the atmosphere, it was snapped up by the side-hood exhaust of a Type W Roto-Clone* (Arrangement C) and transformed into a harmless, easily disposed sludge.

The Type W Roto-Clone and AAF Shakeout Side-Hood combine all the features of complete dust control—confinement at the source, effective exhaust, high efficiency collection and discharge of consolidated sludge without creating a secondary dust problem. The Type W is a wet-type collector, combining water sprays and dynamic precipitation. Operation requires little water and no recirculating equipment.

Dust from shakeouts, sand conditioners and grinders; smoke and fumes from electric furnaces — all can be controlled effectively and economically with one of the many types of Roto-Clone equipment.

Write today for complete information or call your local AAF representative.

AMERICAN AIR FILTER COMPANY, INC.
266 Central Avenue, Louisville 8, Ky.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

®AAF

ROTO-CLONE®
DUST CONTROL EQUIPMENT

*Roto-Clone is the trade-mark (Reg. U.S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.

These new folders are available upon request.

WHERE MOLDS M
ASSURE WHEELS O

STERLING'S PRODUCT DEVELOPMENT TECHNIQUE

Regardless of demand, Sterling's stock of molds is sufficient to make available all necessary types for quick production of the "Wheels of Industry" you need. Each mold is an advance visualization of the many manufacturing details necessary to produce each abrasive item . . . a positive assurance of superior quality in your "Wheels of Industry".

"THE WHEELS OF INDUSTRY"
STERLING
GRINDING WHEELS

MADE TO PRECISE DIMENSIONS OF UNALTERABLE ACCURACY

Molds of special, heat treated steel, created and manufactured under the exacting conditions of Sterling's New Research and Development Program, assure grinding wheels of precise accuracy. Each wheel, segment or abrasive shape imposes forming problems which Sterling technicians solve. Sterling's mold department has sufficient numbers of each type to assure quick production of the "Wheels of Industry."

The exacting requirements under which Sterling Grinding Wheels are produced, the application of new techniques and creative skills—all are ample assurance that the abrasive tools you need can be quickly furnished to the degree of perfection necessary for the solution of your grinding problems.

Fortified by the decades of experience represented by a competent staff of engineers and laboratory technicians, Sterling's New Research and Development Program has much to offer industrial executives seeking the better-than-ordinary grinding wheel. A study of your particular needs can be made at no obligation.

STERLING RESEARCH AND DEVELOPMENT IN ACTION

FIRST STEP · Phoning your nearby Sterling distributor is a good way to solve any grinding problem that may suddenly arise.

SECOND STEP · Your distributor's representative, in company with a Sterling engineer, will quickly call and consult with your operator.

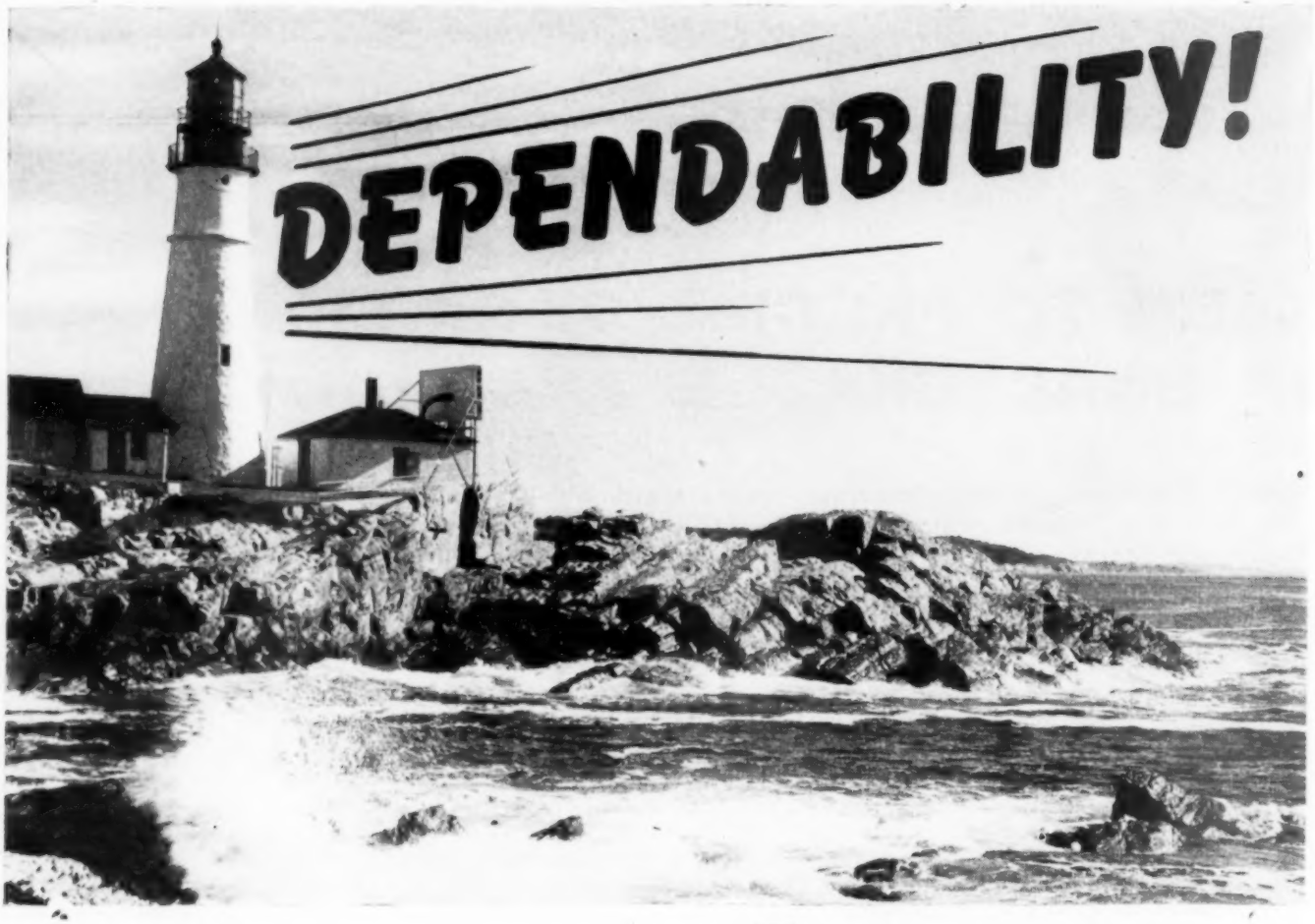
THIRD STEP · Back in the Sterling laboratory, the technical details of your grinding job are studied and a remedy found in a wheel of special specification.

FOURTH STEP · The advantages of working closely with your Sterling distributor and engineer are apparent in the quicker service and better grinding obtained.

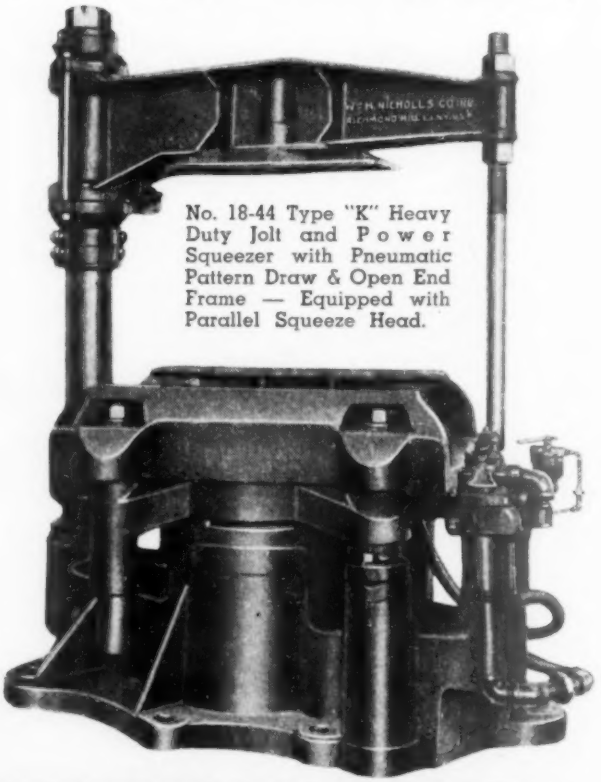
THE STERLING GRINDING WHEEL DIVISION
of
THE CLEVELAND QUARRIES CO.
TIFFIN, OHIO

Since 1885, Manufacturers of "The Wheels of Industry"

Branches: Boston, Chicago, Cleveland, Detroit, Los Angeles, Philadelphia, New York. Distributors In All Cities.



● Nicholls Molding Machines give you DEPENDABILITY plus. You can DEPEND on these machines to withstand the pressure of constant use and to continually produce the maximum number of good molds. Nicholls Molding Machines place their DEPENDENCE on greater precison and power giving the best value at far lower costs. Nicholls has a complete line of stationary and portable types for the production of light, medium and heavy castings. Can be furnished with electric controls for push button operation.



No. 18-44 Type "K" Heavy Duty Jolt and Power Squeezer with Pneumatic Pattern Draw & Open End Frame — Equipped with Parallel Squeeze Head.

Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL 18, LONG ISLAND, NEW YORK

ESTABLISHED 1910

Foreign Manufacturers and Selling Agents—For Continental Europe and Great Britain
George Fischer, Ltd., Schaffhausen, Switzerland

NICHOLLS

Bulletin on SUPER REFRACTORIES

by CARBORUNDUM
TRADE MARK

NO. 6 DECEMBER, 1949

How Super Refractories Reduce Operating Costs

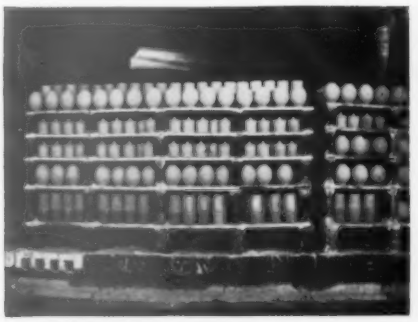
Where the reduction of over-all operating costs or improved performance is a major consideration, installation of super refractories offers many economic advantages. Often, the original cost of the installation is more than repaid by increased service life alone. Further economies are obtained in freedom from frequent shutdowns—less maintenance and lowered replacement costs. Such benefits result in cases where only a few brick are used to eliminate a costly trouble spot as well as in complete installations where the durability of super refractories effects considerable savings.

The exceptional characteristics of super refractories by CARBORUNDUM frequently provide production and economic advantages no less important than the longer life obtained. These are realized in lowered fuel consumption, increased output, faster and more uniform heat transmission with resultant improvement in ware quality and fewer rejects. In addition, tough disagreeable maintenance and cleaning jobs are made easier for labor crews.

The net result is an operation that is more efficient. Production is up while costs go down. These benefits stem directly from the unique properties of super refractories by CARBORUNDUM.

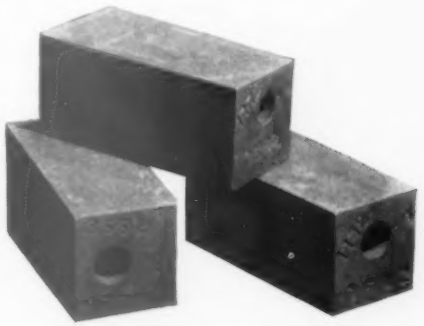
Physical Properties of Super Refractories by CARBORUNDUM
TRADE MARK

	CARBOFRAX	MULLFRAX	MULLFRAX S	ALFRAX K	ALFRAX B	ALFRAX BI
Heat Conductivity at 2200°F. in BTU/hr. sq. ft. and °F. /in. of thickness	109 BTU	16 BTU	9 BTU	24 BTU	12 BTU	7 BTU
REFRACTORINESS PCE CONE	37-40	38-39	37-38	37-39	39-40	38-39
SPALLING RESISTANCE	High	High	High	Good	Good	Good
ABRASION RESISTANCE	High	Medium	Medium	High	Medium	Low
THERMAL EXPANSION (25°—1400° C.)	.0000044	.0000059	.0000069	.0000074	.0000086	.0000086
MODULUS OF RUPTURE @ 2460° F. PSI	800-3125	100-250	175-475	100-1050	100-225	50-100
WEIGHT 9 IN. STRAIGHT	9.25 lbs.	9 lbs.	8 lbs.	10.1 lbs.	7.25 lbs.	4.8 lbs.



Load Capacity Increased 20% Tile and Post Service Life Extended

Using low cost CARBOFRAX I-beam posts in place of large refractory cylindrical posts has enabled this producer of hotel china hollow ware to increase setting space per car by about 20%. With no evidence of splitting, squatting, oxidation, or cornering after a year's service, a more stable setting is realized. Moreover, the cut in overall dead weight receives credit for considerable savings in fuel. Also worth noting is the "new" condition of the CARBOFRAX tile after 150 trips . . . only a portion of the normal life expectancy of this superior material. These remarkable results were achieved on a 28 hour cycle at 2250°F which, at times, was speeded up as fast as 13-14 hours at temperatures up to 2280°F. The kiln is a 30′ circular by Allied Engineering Division.



Avoid Expensive Delays for Slag Hole Replacement

In continuous-pour cupolas, slag hole replacement during a run is eliminated through the use of CARBOFRAX silicon carbide slag hole blocks. These dense durable blocks resist slag erosion . . . retain their uniform hole size. There is practically no enlargement even when the blast is on. The slag stream is practically constant. Standard sizes are available for immediate shipment. Other sizes can be made to order.

"Carborundum," "Carbofrax," "Mullfrax," "Silfrax," "Alfrax" are registered trademarks which indicate manufacture by The Carborundum Company

Address all correspondence to: Dept. D-129, THE CARBORUNDUM COMPANY, Refractories Division, Perth Amboy, New Jersey

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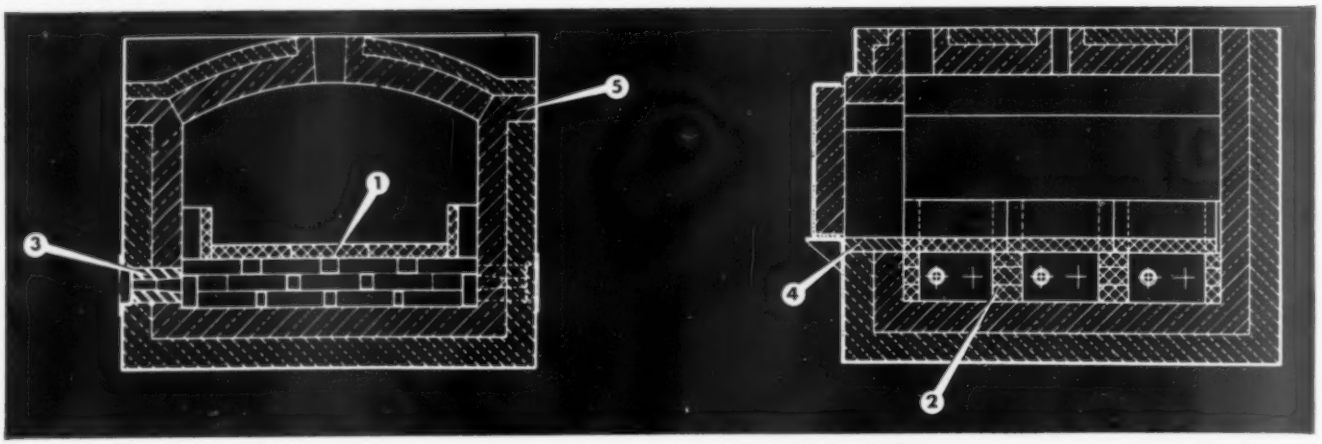
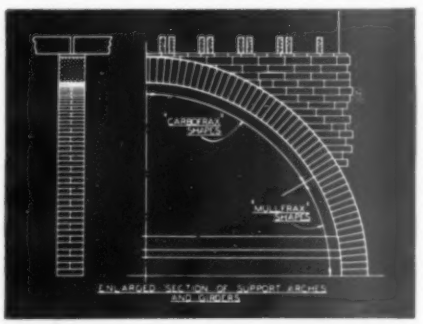


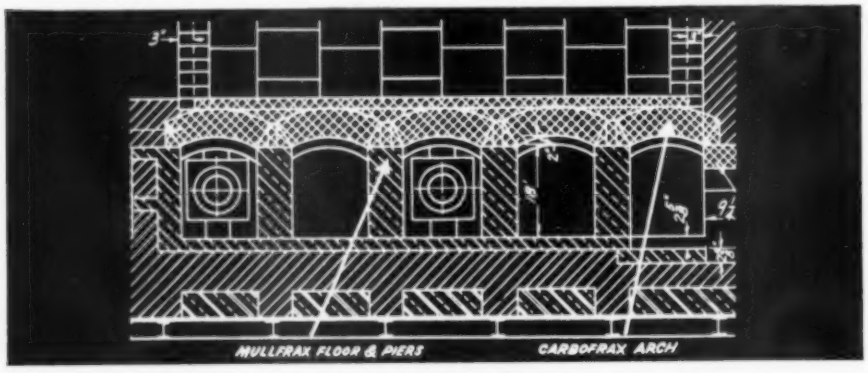
Improving Efficiency of Large Oven Furnace

A combination of super refractories is used in this installation with excellent results. (1) Sectional Hearth of CARBOFRAX tile transmits heat rapidly through floor and uniformly throughout work chamber... sustains heavy loads at high temperatures... resists cracking and spalling. Service life is extended, work quality improved, rejects reduced, maintenace costs cut and fuel consumption lowered. (2) CARBOFRAX or MULLFRAX electric furnace mullite supports assure a flat hearth for longer periods, have high strength at extreme temperatures, resist spalling and cracking, minimize repairs and maintenance. (3) MULLFRAX S converted kyanite prefired burner blocks or burner tunnels of rammed ALFRAX cement promote lower repair and replacement costs. Throat dimensions are held longer... fuel combustion is more efficient. Low thermal conductivity offsets possible blowbacks and heat loss. (4) MULLFRAX S shapes lining the door opening resist spalling and abrasion; minimize heat loss. (5) ALFRAX BI aluminum oxide or MULLFRAX S main linings require fewer repairs; are extremely refractory. Low thermal conductivity retards heat flow to shell. Low heat capacity and durability also help promote more efficient production.

Super Refractories Withstand Severe Service of Water Gas Carburetors and Superheaters

As more severe conditions are imposed on refractories because of increasing gas production rates—the unique characteristics of CARBOFRAX and MULLFRAX arches and CARBOFRAX girder tile offer cost and production advantages. Used successfully under even more rigorous conditions, these materials possess exceptional strength, refractoriness, thermal conductivity and chemical purity. In the structure illustrated, simple inexpensive shapes used to form the support arch carry heavy loads without deformation at elevated temperatures. They are impervious to gas penetration, lessen carbon deposits and remain comparatively clean. The strong girder tile, made in smaller and thinner cross-sections, permit increased gas flow while amply supporting superimposed checkerwork and resisting abrasive effects of high velocity gas streams.





Enameling Furnace Substructure Provides Longer Continuous Service

In this typical porcelain enameling furnace substructure, CARBOFRAX arches offer the advantages of high heat transfer, long life and resistance to elevated temperatures... provide adequate and uniform support. The combustion chamber floor and piers are built of MULLFRAX brick for their lasting high load carrying strength at elevated temperatures, chemical stability and resistance to cracking. The CARBOFRAX muffle, with its high thermal conductivity, assures uniform working chamber temperatures, increased output and minimum costs. The net result is realized in overall improved furnace efficiency and economy.

A complete file of informative literature covering super refractories is available through The Carborundum Company. There are facts and figures on installations in specific fields. To obtain copies of reports, booklets and catalogs of particular interest is a simple matter. Merely select from the list printed here. Copies will be sent you at once. No obligation, of course.

Super Refractories by CARBORUNDUM (general catalog)

Super Refractories for the Ceramic Industry

Super Refractories for the Process Industry

Super Refractories for Boiler Furnaces

Super Refractories for Heat Treatment Furnaces

Super Refractories for Gas Generators

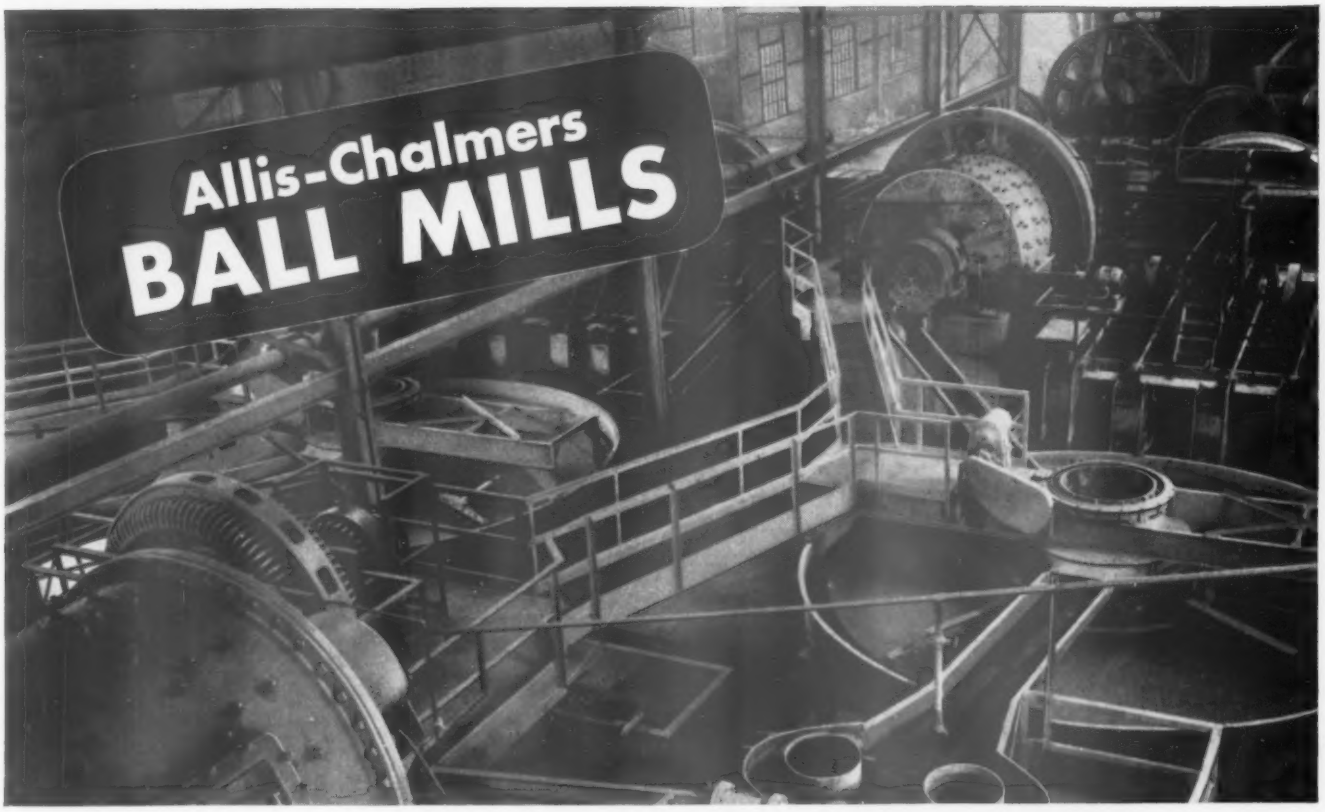
The FRAX Line of Cements

CARBOFRAX Refractory Skid Rails

Bulletins Nos. 1, 2, 3 on Underdrain Systems and Diffuser Media

Dept. No. D-129

THE CARBORUNDUM COMPANY
Refractories Division
PERTH AMBOY, NEW JERSEY



Grind 3⅓ Million Tons of Cement Kiln Feed

100 HOURS of tough-going grinding service every week — that's working schedule of these two A-C ball mills, in operation 12 years, grinding mixed limestone, shale and sand to a fineness suitable for kiln feed. Yet, in 12 years only screen plates, lining plates and grinding media have had to be replaced.

Stamina and low maintenance like this are *typical* of on-the-job records of Allis-Chalmers grinding mills. And here are a few reasons why:

- Heavy welded plate shells are "stress-relieved" as a unit to eliminate strains around welds.
- Trunnions cast integral with heads for added strength. Fewer parts.
- Extra large bearings . . . low bearing pressure . . . long bearing life.
- Accurately machined mill heads and shell flanges provide perfect alignment when bolted together.

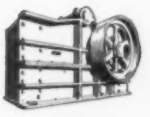
In addition to long life, you'll get top efficiency and economy when you specify Allis-Chalmers grinding mills. A-C builds five separate types of mills in a maximum range of sizes, with modifications to suit your requirements.

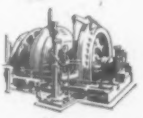
SUITABILITY CUTS COSTS

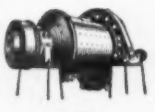
Ball mills, for example, are available in overflow, intermediate, low level diaphragm, and dishpan grate types . . . with various types of feeders, mill drives and liners. Mills are furnished complete with direct motor drive and control or V-belt drive. One company responsibility assures proper selection for efficient performance.

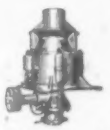
The Allis-Chalmers representative in your area can aid you in obtaining practical, *usable* advice on your grinding problems. Call him today. Allis-Chalmers offices or distributors are in principal cities in the U.S.A. and throughout the world.

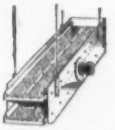
Kilns, Coolers, Dryers


Jaw Crushers


Hoists


Mills


Gyratory Crushers


Vibrating Screens

AND OTHER EQUIPMENT FOR THE CRUSHING, CEMENT AND MINING INDUSTRIES

ALLIS-CHALMERS, 1032A SO. 70 ST.
MILWAUKEE. WIS.

ALLIS-CHALMERS

A-2840

Increase Production

with the

ROTOPLANE SPEED SIFTER ★ RED ELECTRIC VIBRATORS

ROTOPLANE SPEED SIFTER

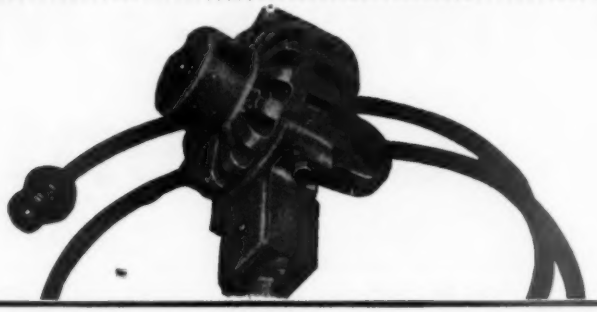
The ROTOPLANE Speed Sifter is an *improved* sand riddle of much greater capacity and much longer life. One size and type serves all purposes in the foundry—does *all* your sifting more quickly and economically.

It is easily handled by one man, weighs approx. 90 lbs., is 62 in. high overall. The one-piece frame of tough aluminum alloy makes for a remarkably effective vibration. Its smooth, free, rotary action vastly increases bearing life; all bearings grease packed. All mechanism of the ROTOPLANE is *completely* enclosed—no bearings or activating parts of any kind exposed to dust and grit.

The Quick-Change Sieves are instantly interchangeable, mounted in smooth, flat steel ferrule, with 20-inch diameter clear sifting area. No jagged edges to tear workers' hands, no storage problem.

$245.00 f.o.b. Chicago—complete with cable, safety ground wire. Standard 1/3 h. p. motor, 110 volt, 60 cycle, single phase and 220 volt, 1 or 3 phase.

UNIVERSAL FREE - WHEELING RIDDLE equipped with motor as above $225.00



RED ELECTRIC VIBRATORS

True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

(All Prices f.o.b. Chicago)

No. 1—Light match plate work	$11.00
No. 2—Medium match plate work	13.60
No. 5—Heavy match plate, tub and bench work	18.40
No. 9—Machine and heavier work	26.80

Third (ground) wire per U. S. Govt. code—furnished with No. 9 at no extra cost; $1.20 extra with Nos. 1, 2 and 5 vibrators.

KNEE SWITCHES for operating Red Electric Vibrators: Single pole $5.00, Double pole $6.50.

FOUNDRY SUPPLIES MANUFACTURING CO.

2221 Orchard Street **Chicago, Illinois**

CABLE ADDRESS: "ROTOPLANE CHICAGO"

Get out from behind the 8 ball

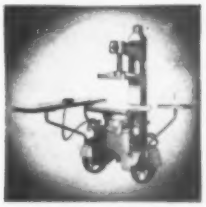
YOU CAN LOWER YOUR COST WITH

DAVENPORT MOLDING MACHINES

Jolt Rollover Draw, Model A

Jolt Rollover Draw, Model SA

Jolt Squeeze, Model 10-JX (stationary)



Jolt Squeeze, Model 10-JX (portable)

Jolt Pin Lift Model AJS (stationary)

Jolt Pin Lift Model AJS (portable)

Sometimes everything looks like a pain in the neck—the eight ball keeps rolling in front of you.

Labor and operating cost block your sales. It is then time to take a look at mechanizing your molding department.

Davenport Molding Machines will increase your production and lower your costs. They will help you get out from behind the eight ball.

Let us send you our complete catalog showing over 60 sizes of foundry molding machines and the many outstanding features available only on "Davenport".

DAVENPORT MACHINE AND *Foundry Company*

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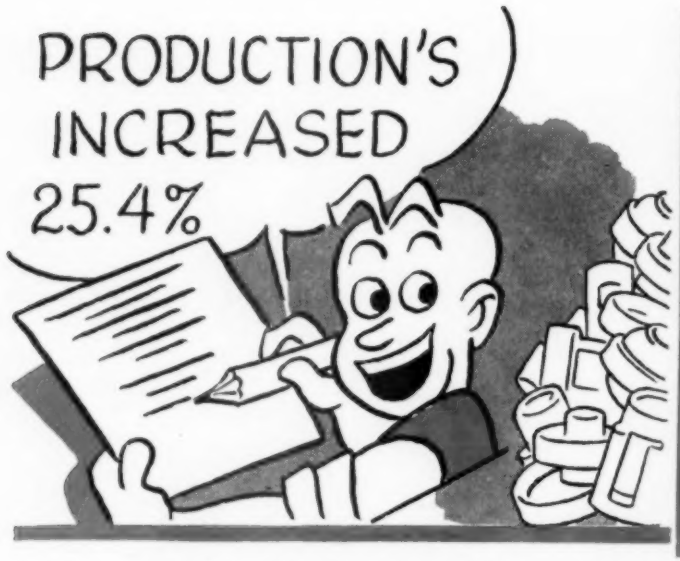

Manufacturer* Cuts Blast Cleaning Costs 51.8% with MALLEABRASIVE

Test by Reading Gray Iron Castings Inc., of Reading, Pa. proves Malleabrasive saves 51.8% or $3,908.74 a year on blast cleaning costs in their plant.

If you want to save on blast cleaning costs . . . look at the results of this test made by Reading Gray Iron Castings, Inc. After just seven weeks the test showed that 5,900 lbs. Malleabrasive did the same job as 10,300 lbs. of conventional abrasive...replacement parts costs were down 64.7% . . . production increased 25.4% while the cost per ton cleaned was slashed by 51.8%. Here's concrete proof that Malleabrasive's the best abrasive you can buy!

Make Your Own Test!

We'll send you the data needed to run a comparative test like this right in your own cleaning room! Now you can prove to yourself that Malleabrasive slashes cleaning costs up to 50% and more. Malleabrasive is more than "heat treated" or "annealed". Malleabrasive is guaranteed to outperform ordinary abrasives when comparative tests are properly run.

For full details, plus a copy of other Malleabrasive tests, write for TEST INFORMATION, THE GLOBE STEEL ABRASIVE CO., Mansfield, Ohio.

Packed in new orange striped 100 lb. bags

Save on blast cleaning with

PATENTED† Malleabrasive®

†U.S. Patent #2184926
(other patents pending.)

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO

• MANUFACTURERS OF METAL ABRASIVES SINCE 1907 •

speed doesn't sag under load

Because they work at full speed under all loads, CP Super Cycle Grinders remove more metal at less cost than other grinders. With the lowest ratio of weight to horsepower ever built into a portable tool, they are easier to handle . . . more quickly located on work . . . less tiring to hold.

Maintenance is outstandingly low. There are no brushes to replace, no armatures to burn out, because the motor—operating on 360 cycle, 3-phase, 220 volt current—is of squirrel cage induction type.

Straight grinders are available with 4″, 6″ and 8″ elastic bonded grinding wheels; 2″, 2½″, 2¾″, 4″ and 6″ vitrified wheels; 4″, 6″ and 8″ wire brushes. Angle grinders have 6″ cup wheels; angle sanders are available with 7″ and 9″ pads.

Write for copy of Catalog 905-2

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
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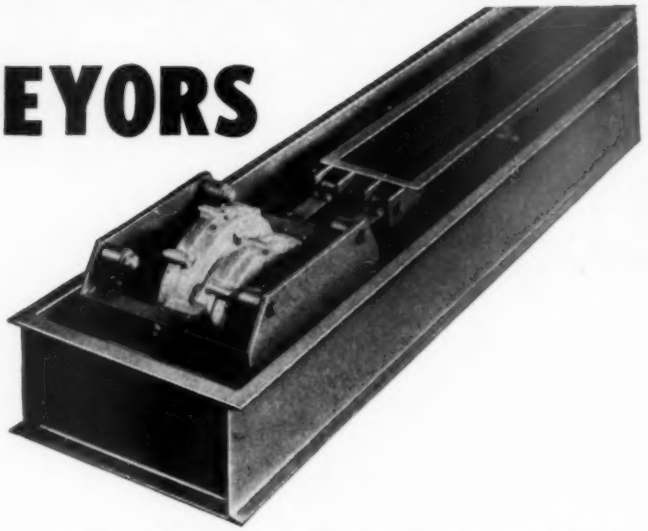
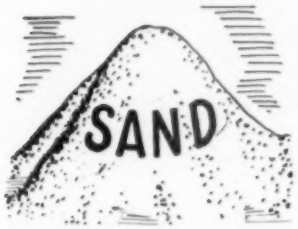
Questions and Answers about AJAX LO-VEYORS



WHAT MATERIALS CAN BE HANDLED?

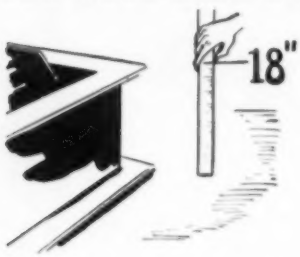


Dry aggregate materials ranging from granular up to 6" lumps such as sand and castings.

IS DUST-TIGHT OPERATION AVAILABLE?

Flat conveyor pans with cover and booted inlets and outlets and also gastight tubular conveyors permit handling materials without contamination or explosion

HOW MUCH HEAD ROOM IS REQUIRED?



Average overall height is less than 18" except for a short distance where shaker is mounted.

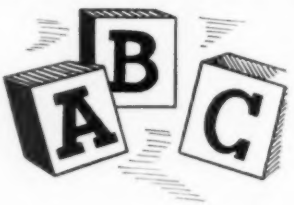
HOW DO AJAX LO-VEYORS REDUCE COSTS?

They eliminate moving materials by costly non-productive shovel and wheelbarrow methods.

ARE ABRASIVE CONDITIONS HARMFUL?

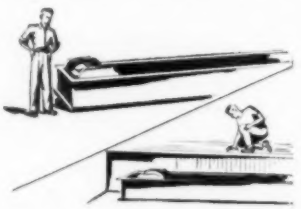
Unaffected by sand and abrasives, they are ideal for foundries, chemical plants, cement mills, etc.

HOW DOES AJAX REDUCE WEAR?



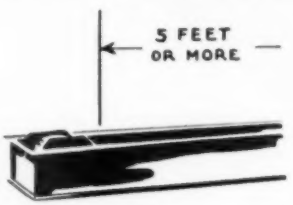
Reciprocating drive unit is completely enclosed. All eccentrics, idler pulleys and exposed bearings are eliminated.

CAN AJAX LO-VEYORS BE INSTALLED ANYWHERE?



They are self-contained units ready to set in place and use. Easily installed on or below floor or suspended from wall or ceiling.

CAN THEY BE USED FOR SHORT AND LONG CARRIES?



Lengths, widths and capacities to suit various materials, plant conditions and requirements of the process.

ARE AJAX LO-VEYORS ECONOMICAL?

They are economical to buy, operate and maintain.

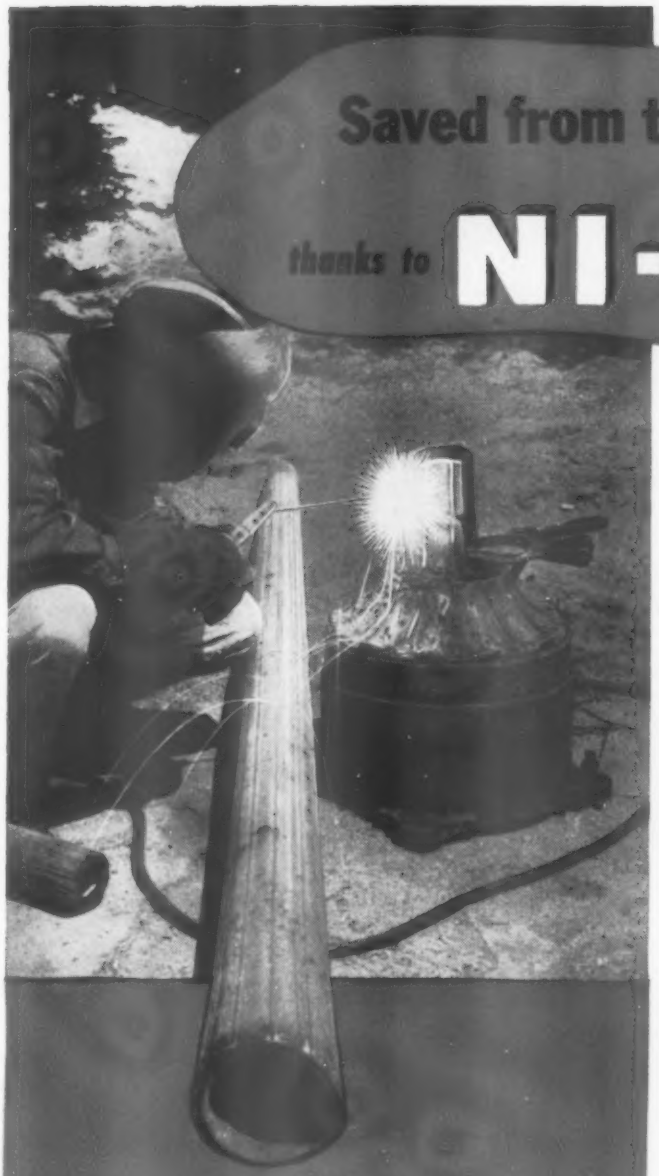
•

Write telling us your material handling needs and Ajax engineers will make recommendations.

AJAX FLEXIBLE COUPLING CO. INC. WESTFIELD, N. Y.

Saved from the scrap heap...

thanks to NI-ROD



Repairing a 250-pound cast iron lamp post with 1/8" NI-ROD Electrode. The General Welding Service, Elmhurst, L. I., N. Y. find that NI-ROD gives the best results of any electrode they have tried in this service. NI-ROD gives such smooth bead contour that it is not necessary to grind welds flush. A new coat of paint completes the repair.

IT HURTS to scrap a casting. There's the lost time, delayed order, irate customer . . . and the plain cussedness of having to do a job over.

Well, here's some good news! Foundries all over the country are saving defective castings from the scrap heap with NI-ROD*, Inco's easy-to-use electrode for cast iron welding.

NI-ROD can't be beat for cast iron repairs because it needs no coddling...seldom requires preheating or post-heating...gives stable arc on AC or DC...and makes sound, *machinable* welds.

Typical example of NI-ROD's on-the-spot usefulness was the *Case of the Irreplaceable Lamp Post.*

A motorist, whose daring exceeded his skill, demolished a lamp post in Forest Hills Gardens, Long Island, N. Y. This was no ordinary lamp post. It was a work of art in cast and wrought iron, virtually irreplaceable, so repaired it *had* to be.

Mr. Patrick O'Brien, superintendent of the Forest Hills Gardens development, sent a call for help to Messrs. Thompson and Shannon of General Welding Service, Elmhurst, L. I. They arrived on the scene equipped with mobile welding generator and NI-ROD. Result? In short order, the precious lamp post was back on its feet, practically as good as new.

Lamp post mayhem is a fairly common occurrence in his bailiwick, reports Mr. O'Brien. But thanks to NI-ROD and the skill of General Welding Service technicians, the aristocratic lighting fixtures are being preserved.

In addition to its usefulness in all-around cast iron maintenance work, NI-ROD gives excellent results in repairing close-tolerance castings. NI-ROD minimizes the danger of warpage, and original dimensions can be preserved.

NI-ROD comes in 3/32", 1/8", 5/32" and 3/16" diameters. Order a five-pound package from your distributor—and see for yourself how NI-ROD takes the "fight" out of welding cast iron. *Reg. U. S. Pat. Off.

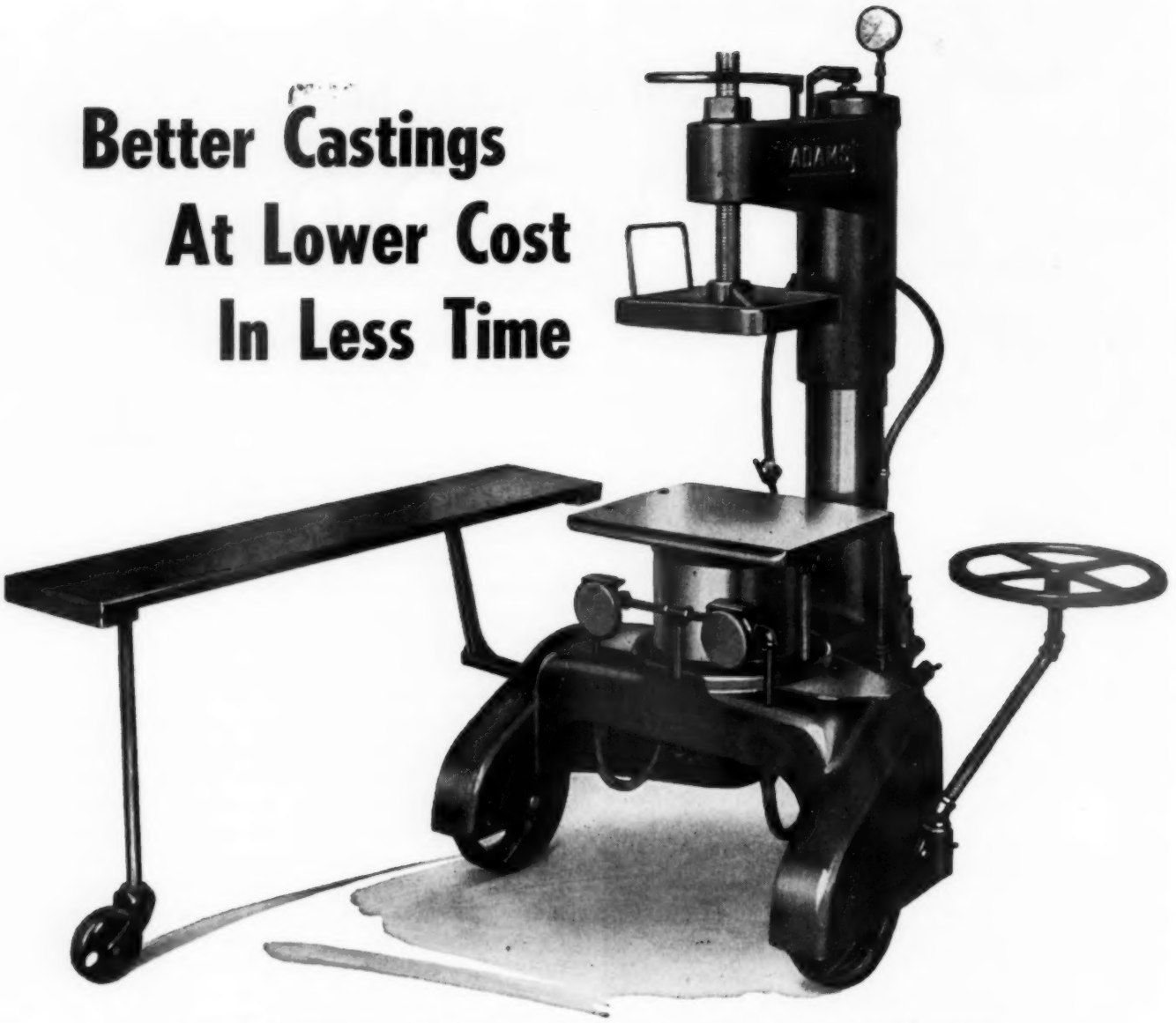
Free—*new welding booklet: "NI-ROD... a new electrode for all cast iron welding."*

THE INTERNATIONAL NICKEL COMPANY, INC.

67 WALL STREET, NEW YORK 5, N. Y.

EMBLEM OF SERVICE INCO NI-ROD TRADE MARK

Better Castings At Lower Cost In Less Time



ADAMS MOLDING MACHINES

IN today's "buyer's market", it is necessary to PRODUCE BETTER PRODUCTS FOR LESS, in order to meet competitive prices and still make a profit. That is why so many modern foundries are installing Adams Molding Equipment. Here are a few of the reasons:

They Produce Better Molds . . . Close tolerances and close control of jolting and squeezing operations insure accurate, uniform molds. Reject losses are minimized.

They Reduce Production Costs . . . Reduction of moving parts to a minimum makes upkeep negligible. Centralized automatic lubrication and protection against sand and dust prevent excessive wear.

They Help Maintain Uninterrupted Production . . . Simple design for easy operation, precision manufacture with the highest quality materials, plus sturdy construction reduce downtime and make possible fast, steady production.

SIZES AND TYPES FOR ANY SQUEEZE MOLDING REQUIREMENTS

Side Rod Type and Post Type

Jolt Squeeze and Jolt-Squeeze-Pattern-Draw Styles

Stationary and Portable Hand Squeezers

Write today for full details in Catalog 705.

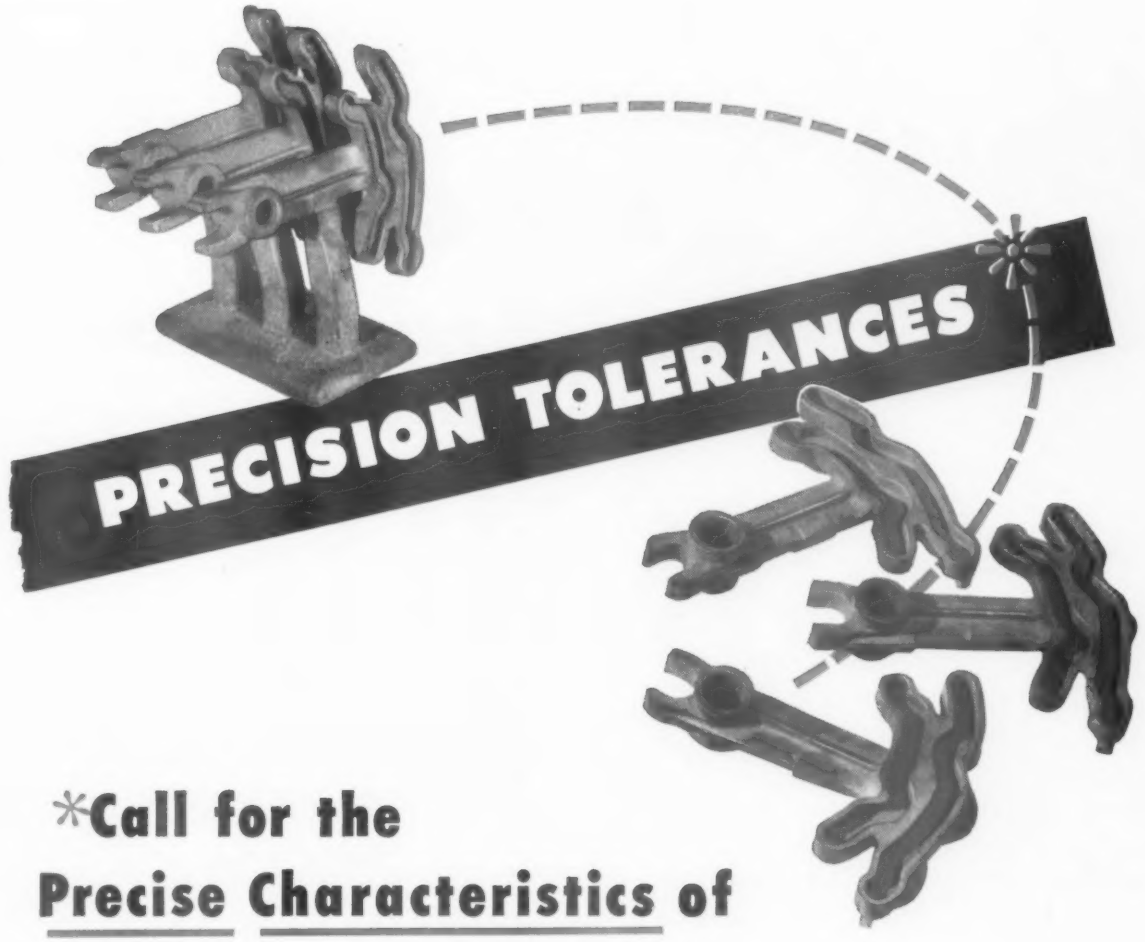
THE ADAMS COMPANY
700 Foster Street
Dubuque, Iowa

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

DUBUQUE, IOWA, U.S.A.



*Call for the Precise Characteristics of CHATEAUGAY PIG IRON

Typical of countless precision casting applications for CHATEAUGAY Pig Iron, are these alloy steel cam guides used by one of America's leading cycle manufacturers. Why? Because CHATEAUGAY—Republic's exclusive low phosphorous, copper-free pig iron—consistently assures predetermined results in every casting job, large or small.

In these parts, for example, tolerances on the camway must be held to .002" in order that machining costs may be kept to a minimum. Camway surfaces must be hard and resistant to wear . . . and the entire casting must be sound and strong throughout. Wherever it is used, CHATEAUGAY provides all of these qualities *and more.*

Consistently uniform "physicals" within narrow specified limits . . . uniformly fine grain structure . . . fast-flowing and even-cooling characteristics . . . high impact value . . . unsurpassed machinability . . . all are excellent reasons why you, too, should investigate the cost-saving advantages of CHATEAUGAY Pig Iron. A Republic Pig Iron Metallurgist will be glad to give you all the facts at your convenience.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic **PIG IRON**

"CHATEAUGAY"	"REPUBLIC"	"PIONEER"
Low-Phosphorus, Copper-Free	(Northern) Foundry, Basic and Malleable	(Southern) Foundry and Basic

REPUBLIC STEEL

Now • an A. P. GREEN Slag-Resisting Mortar

Developed Especially for the Foundry Industry

SATANITE

SATANITE has been developed for laying firebrick in all types of furnaces and ladles in which molten iron or steel, or slag, is in contact with the brick and joint erosion is unusually severe. In this service, SATANITE retards erosion—joints actually protrude ⅛ to ¼ inch beyond the surface of the brick after the brick have been worn back several inches.

In malleable air furnaces where side walls and bottom are laid up with SATANITE, any part of them can be easily removed for patching or rebuilding. SATANITE's long service life in joints gives additional protection to side wall and bottom brick.

Section from a malleable iron air furnace side wall showing protrusion of SATANITE joints after firebrick had worn back several inches.

Use SATANITE bonding mortar to increase the life of the lining in all types of malleable iron air furnaces, ladles, electric furnaces, cupolas and hot metal mixers. Packed in 100-pound moisture-proof multi-wall bags.

A. P. Green REFRACTORY PRODUCTS

Look for the name of your nearby A. P. Green distributor in the yellow pages of your telephone directory or write us for more information.

A. P. GREEN FIRE BRICK COMPANY

MEXICO, MISSOURI, U. S. A.

A. P. GREEN FIRE BRICK CO., LTD. IN CANADA

DISTRIBUTORS IN THE PRINCIPAL CITIES OF THE WORLD

Nash
GREAT CARS SINCE 1902

In a recent foundry modernization program at Nash Motors, Kenosha, Wisconsin, division of Nash-Kelvinator, two Allis-Chalmers centrifugal blowers replaced rotary positive blowers! Rated 14,000 cfm at 2.5 lbs. G, both blowers are driven at 3550 rpm by Allis-Chalmers induction motors. They are compact . . . mounted out-of-the-way on light, simple foundations.

Maintain Air Weight and Volume With A-C Blowers!

BOTH WEIGHT AND VOLUME OF CUPOLA AIR can be regulated with Allis-Chalmers centrifugal blowers equipped with air weight control. A-C blowers solve the problem of oxygen control in cupola operation by automatically delivering more or less air, as required, without the necessity of blowing off to atmosphere, as with positive pressure blowers.

With A-C blowers, a metered amount of oxygen enters the cupola; you get a uniform temperature and greater uniformity in composition of the metal.

NOTE FEATURES OF A-C BLOWERS!

▶LIGHT WEIGHT requires simple foundation. Close coupled design makes them compact.

▶SIMPLE CONSTRUCTION with one moving part, the impeller, usually "overhung" on the motor shaft — supported by motor bearings.

▶ONLY MINIMUM MAINTENANCE needed to operate A-C blowers with original efficiencies every day for years! Cast casings give long life impossible with fabricated construction.

Specify A-C blowers for new cupola installations or replacements! For more information, call your A-C Sales Office or write direct.

ALLIS-CHALMERS, 1032A SO. 70 ST.
MILWAUKEE. WIS.

Foundromatic and *Regulex* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

A-2790

Foundry Equipment for Bigger Output-Better Working Conditions!

VIBRATING SCREENS | CUPOLA BLOWERS | FOUNDROMATIC SHAKEOUTS | FOUNDROMATIC CORE DRYER | INDUCTION HEATING & MELTING | REGULEX ARC FURNACE CONTROL

You can get a HYDRO-BLAST

FOR CORE REMOVAL AND CASTINGS CLEANING

DESIGNED TO FIT YOUR INDIVIDUAL FOUNDRY PROBLEMS

★ ***REGARDLESS OF SIZE OR WEIGHT OF CASTINGS OR OF THE TONNAGE TO BE CLEANED PER DAY***

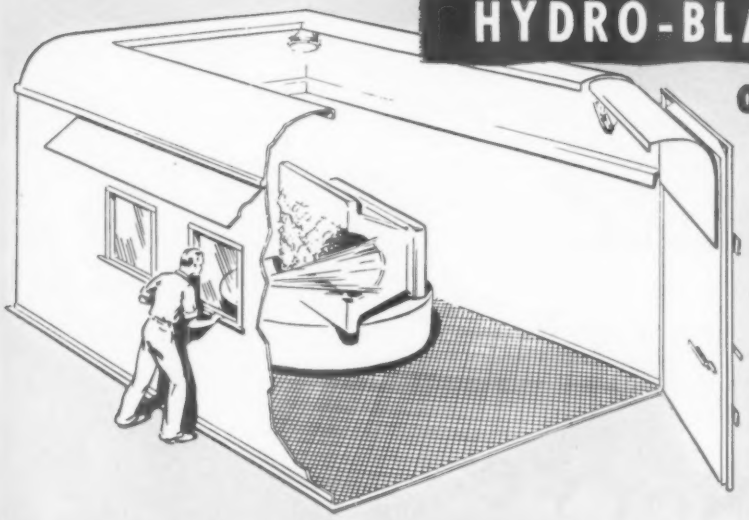
You'll find Hydro-Blast engineers good men to consult on modern cleaning methods—men whose long and intimate experience includes analyzing and solving cleaning problems in foundries of every type and size. That experience is yours to command—and with no obligation. Write us.

NO MATTER WHAT YOUR OWN CLEANING PROBLEM MAY BE, THERE'S AN EFFICIENT, ECONOMICAL HYDRO-BLAST APPLICATION TO ANSWER IT.

HYDRO-

2550 NORTH WESTERN AVE

HYDRO-BLAST ROOM—
operator outside

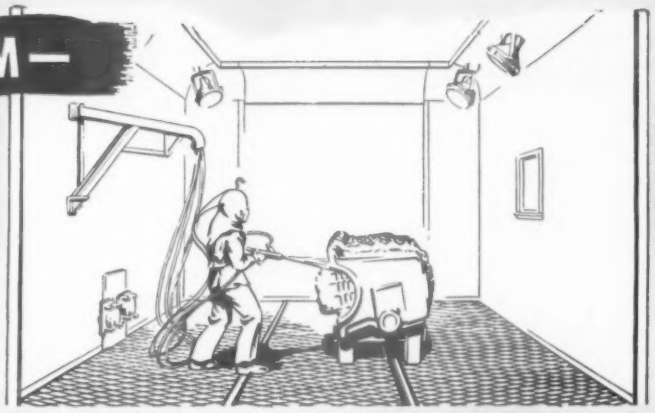


In many instances heavy, deeply cored castings can be economically Hydro-Blasted by means of large, mechanically mounted blast equipment controlled by an operator standing *outside the inclosure.* As a rule the castings are mounted on a turntable.

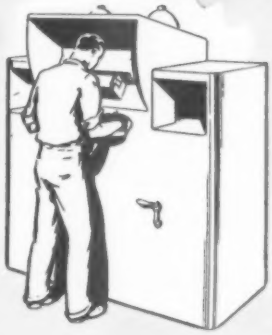
For cleaning castings too large for a turntable, the blasting equipment and operator can be mounted for moving mechanically back and forth across the face of the work.

HYDRO-BLAST ROOM—
operator inside

In foundries producing deeply cored castings, including many custom shops, cleaning can usually be most efficiently and economically done in a splash inclosure by Hydro-Blast operated manually. In many instances, it has been found convenient to handle castings on a turntable.

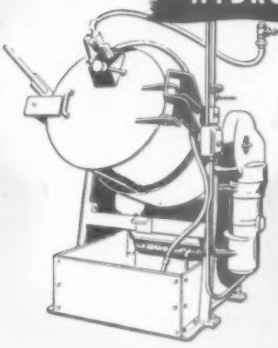


HYDRO-BLAST CABINET—
for cleaning smaller castings



Small castings requiring special individual attention, because of intricate cores or particular finish, can be efficiently and economically cleaned in a Hydro-Blast cabinet: handled by hand, as a rule, in small production; or, where volume production warrants, on a turntable or by conveyor equipped with special jigs, to convey castings through the cabinet.

HYDRO-BLAST BARREL—
for small castings



Small castings suitable for tumbling can be effectively, economically cleaned and finished in the Whiting Hydro-Blast Wet Barrel.

-BLAST CORPORATION

CHICAGO 47, ILLINOIS

FOREIGN REPRESENTATIVES

England, Norway, Sweden, Denmark and Finland — Pneulec Limited, Licensee, Smethwick (near Birmingham) England

France and Switzerland—R. Dureuil, 4 Sauare Du Graisivaudan, Paris 17, France

Belgium—Charles Monseur, 195 Rue Saint Leonard, Liege, Belgium

STOCKHAM VALVES & FITTINGS
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UNION MALLEABLE IRON WORKS
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PHILLIPS MINE & MILL SUPPLY CO.
Pittsburgh, Pa.

MINNEAPOLIS-MOLINE CO.

THE CHICAGO FAUCET CO.

Proudly we Serve

MANY OF AMERICA'S MOST EFFICIENT FOUNDRIES

The best testimony of the worthiness of Ransohoff Wet Method Automatic Star Return casting and Sprue Cleaning Mills and related equipment are names of some foundries wherein Ransohoff equipment is now "at work".

Our new, informative casting cleaning brochure is now ready for distribution and a copy is yours — upon request.

N. RANSOHOFF, INC.

Equipment for the Surface Treatment of Metal

Township and Big Four — Cincinnati 16, Ohio

WM. E. PRATT MFG. CO.
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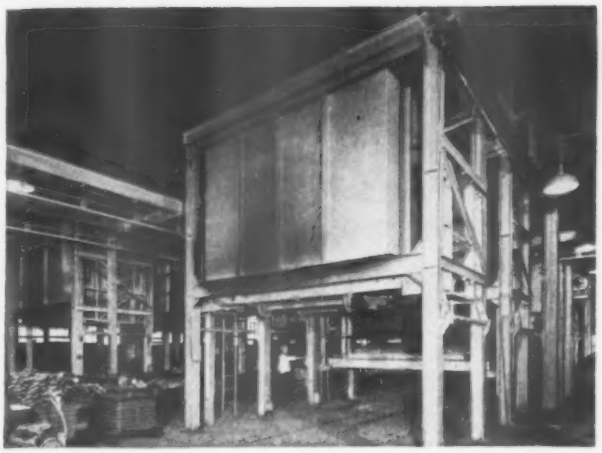
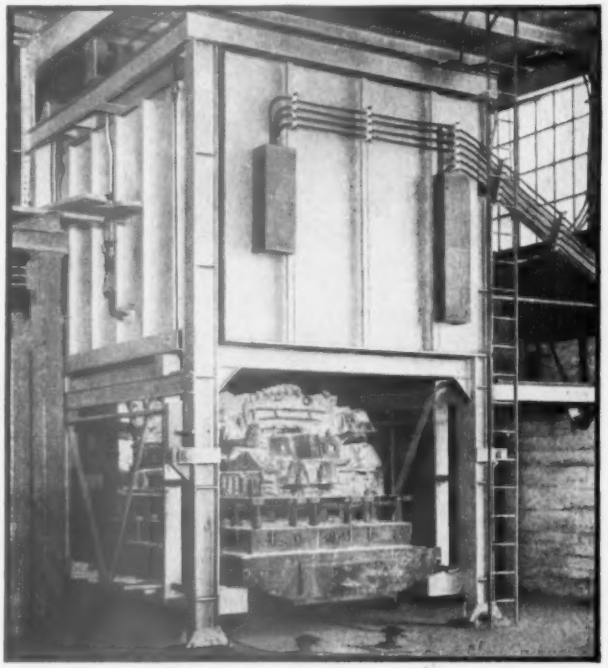
Annealing malleable iron castings

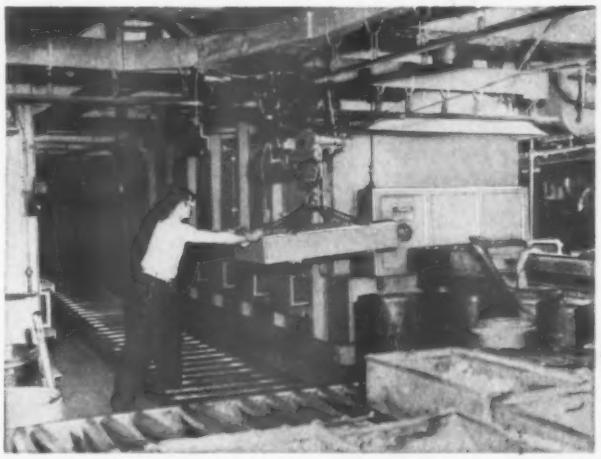


. . . four pairs of G-E electric furnaces anneal 32 tons per day in this midwestern foundry.

Annealing steel castings



. . . one G-E elevator furnace anneals 10 tons per charge in this southern foundry.



. . . two pusher-type G-E furnaces anneal 30 tons per day in this eastern plant.

Annealing grey iron castings

DO IT BETTER *Electrically*

Tell us about your annealing job, and we'll show you what General Electric furnaces can do for your particular operation. G-E furnaces and electronic induction heaters are also available in a variety of types and ratings for brazing, hardening, drawing, soldering, carburizing, and most other heat-treating processes. Ask your nearest G-E office to put you in touch with a G-E Industrial Heating Specialist. Or write direct to *Sect. 720-9, Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

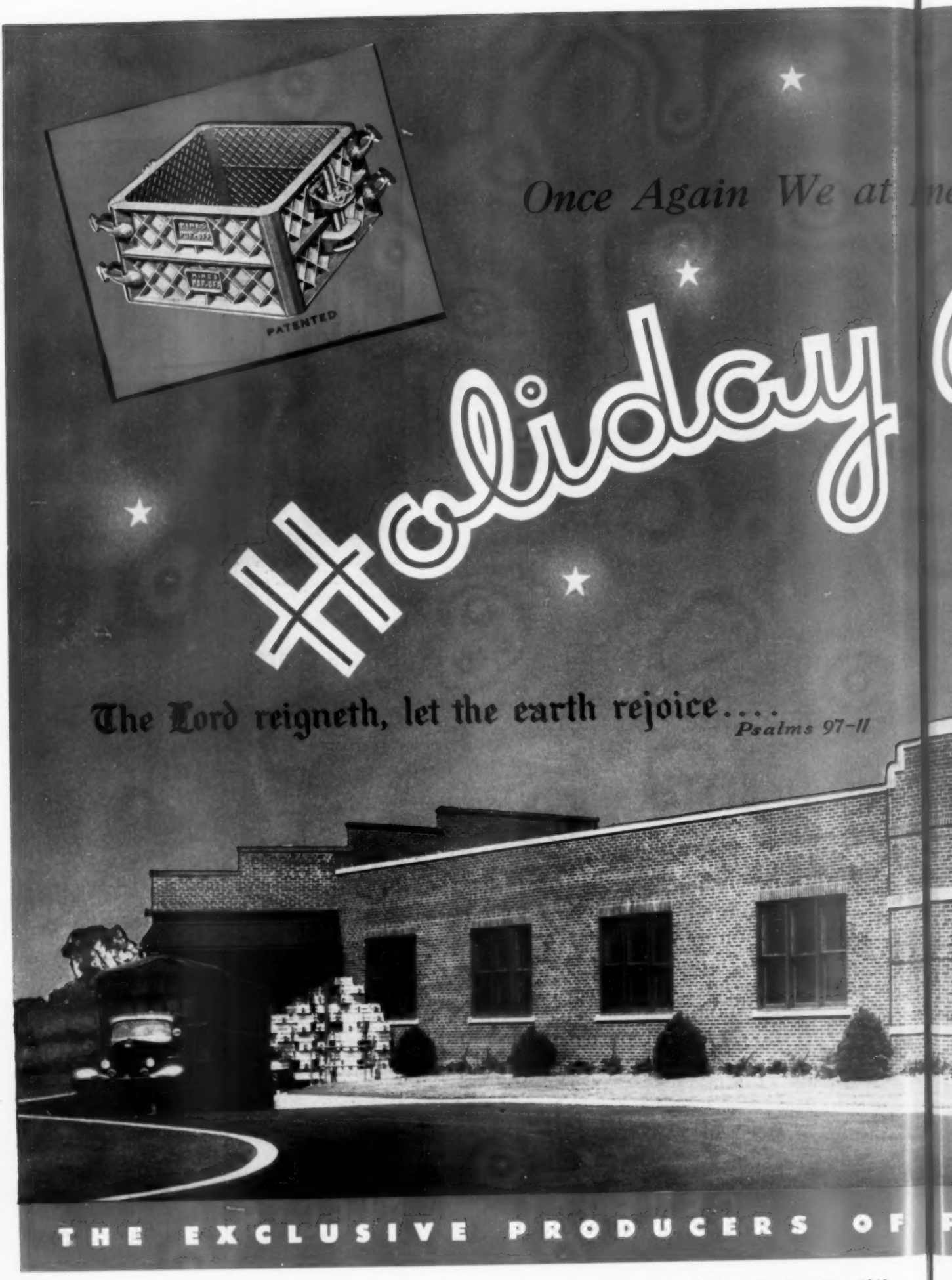
ELECTRIC FURNACES

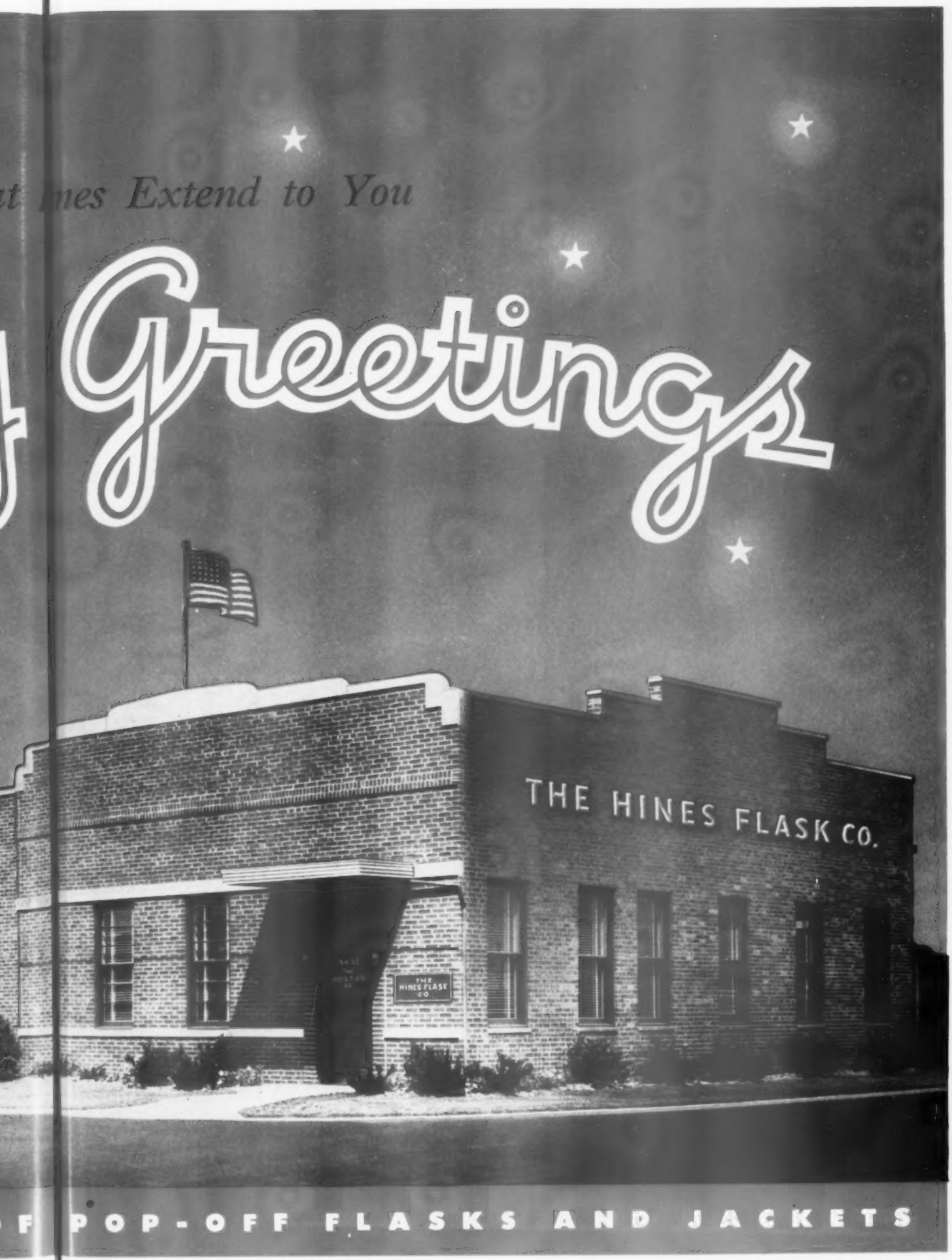
In addition to a shorter time cycle and increased output, they also give you:

- Lower over-all cost
- More uniform, better quality anneal
- Materially reduced cleaning costs
- Minimized thermal losses
- Cleaner, cooler working conditions
- Dependable continuity of service with less maintenance
- Less floor space required

GENERAL ELECTRIC

720-9


PATENTED
Once Again We at
Holiday
The Lord reigneth, let the earth rejoice....
Psalms 97-11
THE EXCLUSIVE PRODUCERS OF


nes Extend to You
Greetings
THE HINES FLASK CO.
THE HINES FLASK CO.
POP-OFF FLASKS AND JACKETS

Take Foundry dust and hot fumes for an "airing"

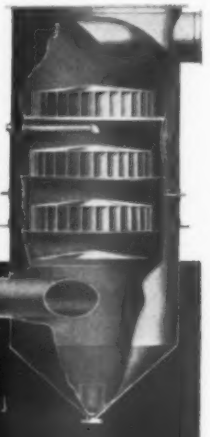
AND MAKE MONEY DOING IT!

You can't afford to put up with these two costly nuisances. They're wasteful of your workmen's time and energy . . . causes high labor turnover . . . the result is higher production costs.

We're in business to rid you of these "production thieves" and improve your output. Schneible Dust Control Systems are custom engineered for your foundry . . . by men who grew up in the foundry business. Many exclusive features are found on Schneible Equipment . . . "Compensating" and "Compensating-Fractionating Air" control are important examples.

Whether you are considering new Pouring Hoods, Shakeout Hoods, Mold Cooling Hoods, Cupola Collectors or any other dust or fume control equipment—be sure Schneible is consulted. Call the nearest representative or write direct to Claude B. Schneible Company.

MULTI-Wash COLLECTORS
Model HC—1500 to 30,000 c.f.m. or multiple units for larger capacities.
Model JC—1000 to 30,000 c.f.m. or in multiple units, if greater capacity desired.

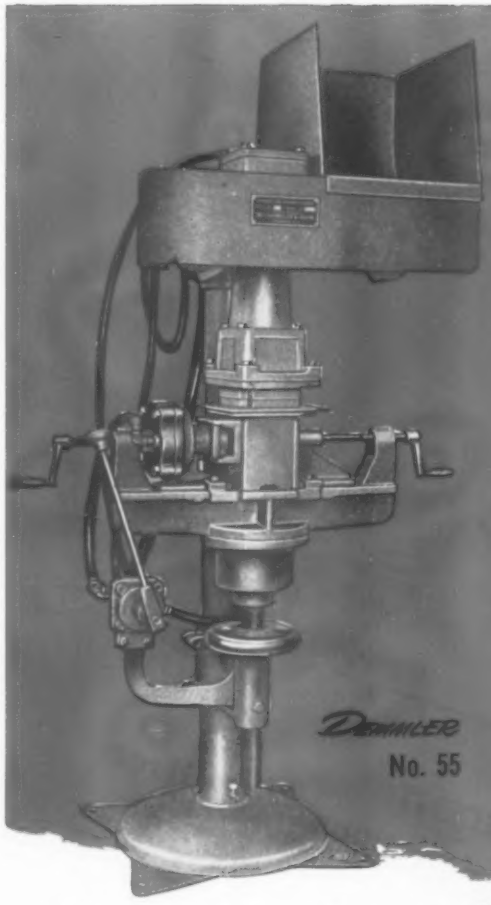


CLAUDE B. SCHNEIBLE COMPANY
P. O. BOX 502 • DETROIT 32, MICHIGAN

U. S. and Foreign Patents Pending

SCHNEIBLE

INCREASE PRODUCTION FOR GREATER PROFITS WITH DEMMLER CORE BLOWERS



Today's high manufacturing costs and stiff competition make high production at low cost an absolute necessity.

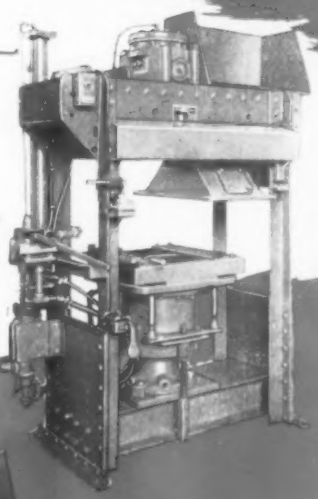
That's why scores of foundries have recently added Demmler core-blowers or replaced their less efficient machines with Demmlers. You, too, can increase your profit margin with Demmler machines. Available in a wide variety of sizes to meet every need, Demmler core-blowers represent an outstanding investment — an investment in greater profits for you!

DEMMLER NO. 55

If your foundry blows small cores, you'll find the DEMMLER NO. 55 a real producer. Complete cycle takes only about three seconds! Newest addition to the long famous DEMMLER line, it has already earned the praise of foundrymen everywhere. The No. 55 will blow cores weighing up to four pounds, will accommodate boxes nine inches long. Machine has both vertical and horizontal air operated core box clamps, automatically controlled by the same valve that blows the core. Simple in construction and operation, the DEMMLER NO. 55 is ideal for short run jobs — a proven money maker! You can't afford to be without this machine.

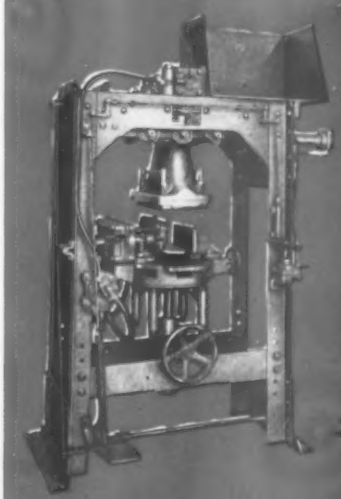
let us help—

You may already own one or more DEMMLER core blowers — or none at all — but in any event we may be able to suggest better applications for increased production — higher profits. Tell us about your core blowing problems; we'll be happy to help you!



DEMMLER NO. 2E

The No. 2E core blower is designed for use on cores which can be blown to advantage by attaching the top half of the core box to the blow plate and drawing the core on the machine. The cylinder has a long center guide stem which slides in a sleeve to insure a draw of extreme accuracy. Two hand valves are used to operate the machine. One moves the carriage from filling to blowing position, and the other raises the table, blows the core, and draws the core. The time of the cycle is about 12 seconds. Sand magazines available to suit customer's requirements.



DEMMLER NO. 1

General purpose machine! The DEMMLER NO. 1 needs no introduction being one of the best known — and liked — core machines in the field. Will blow cores weighing up to eight lbs.

The DEMMLER NO. 1 possesses quick job changing features. Chuck table is raised and lowered by a hand wheel. Chuck jaws are easily adjusted for different core box widths. Different size sand magazines are available. High capacity. Many of these machines have been in continuous, profitable use for more than 25 years with only minor repairs!

Illustrated specification sheets on any of the three illustrated machines will be sent on request

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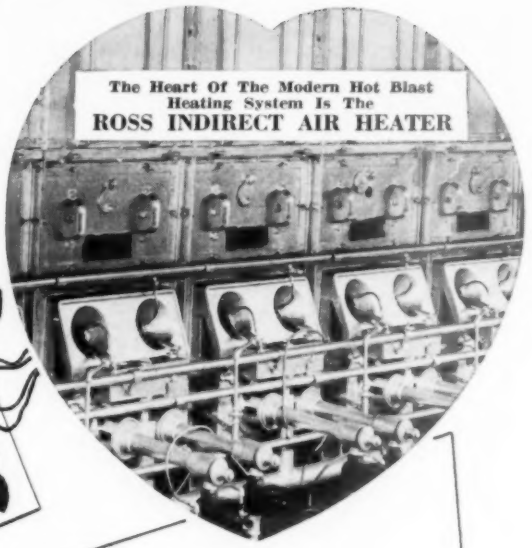

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If you are interested in a properly designed and installed cupola heating system to substantially reduce your operating costs, the logical source for specific information and recommendations is a Ross engineer. Utilize experience to get best results. J. O. ROSS ENGINEERING CORPORATION, 350 Madison Ave., New York 17, N. Y. Offices in Boston, Detroit, Chicago, Los Angeles, and Montreal, Canada.

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A MERRY
CHRISTMAS and a HAPPY NEW YEAR
May the greatest of spiritual possessions—
the Spirit of Christmas—with its
wealth of good will, of gift-giving, of
unselfishness, of happiness in the pleasure
of others be yours in abundance.
To all this, add our high hopes for
a Happy and Prosperous New Year.

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Improving Machinability of GRAY IRON CASTINGS

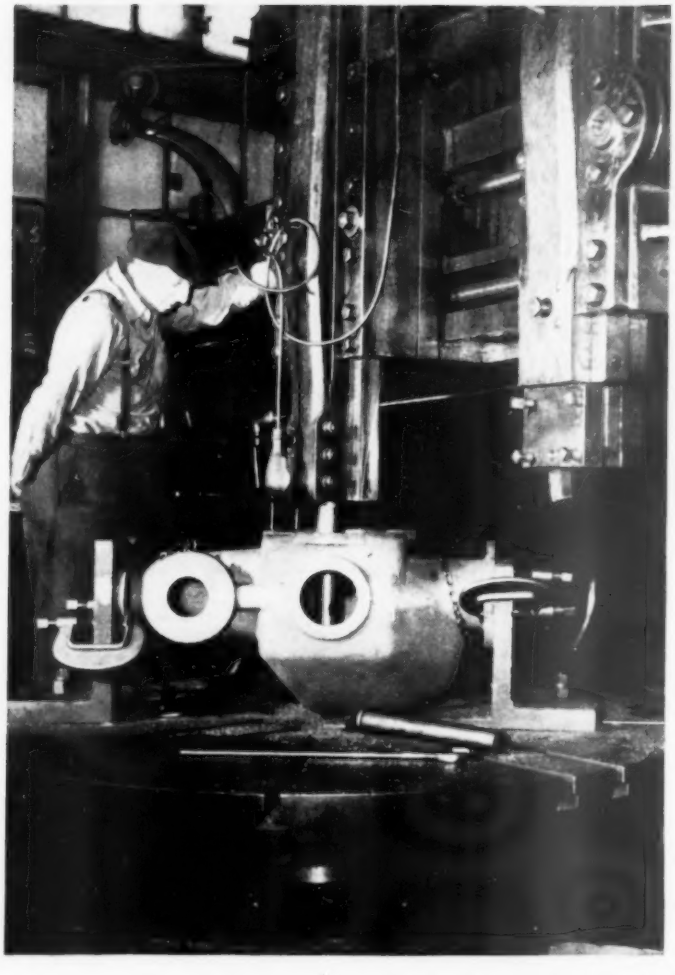
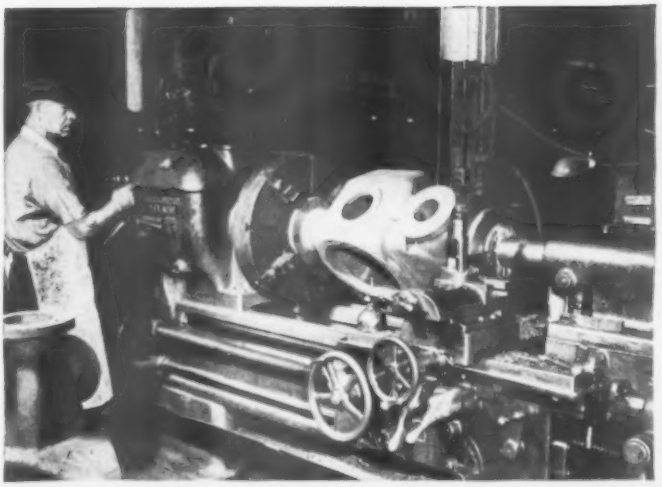
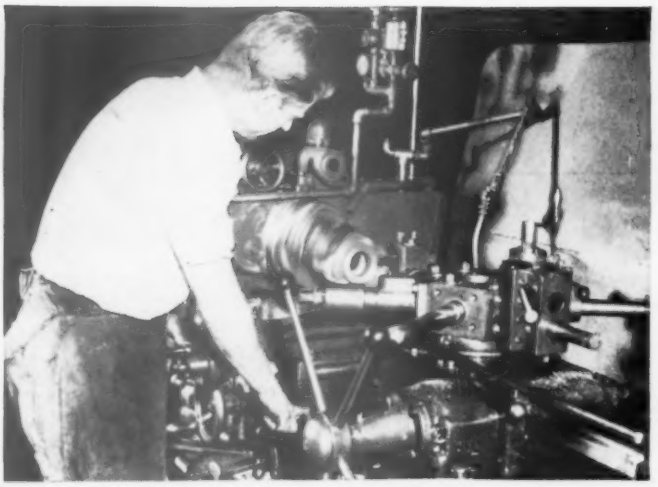


Photo Credit: Photos showing machining of castings, which have been treated with FERROCARBO Briquettes, are by the courtesy of the Rockwell Manufacturing Company, Pittsburgh, Pa. Castings were produced at Monnessen Foundry, a division of Rockwell.





3 IMPORTANT ADVANTAGES

are reported in machining castings which have been treated with FERROCARBO silicon carbide Briquettes.

1. Reduced machining time
2. Lower tool costs
3. Fewer rejected castings

The net result is realized in lower machining costs and increased profits. Complete detailed information on FERROCARBO Briquettes is easily obtainable from our metallurgical staff.

FERROCARBO Briquettes

BY CARBORUNDUM

TRADE MARK

THE CARBORUNDUM COMPANY, Bonded Products and Abrasive Grain Division, Niagara Falls, New York

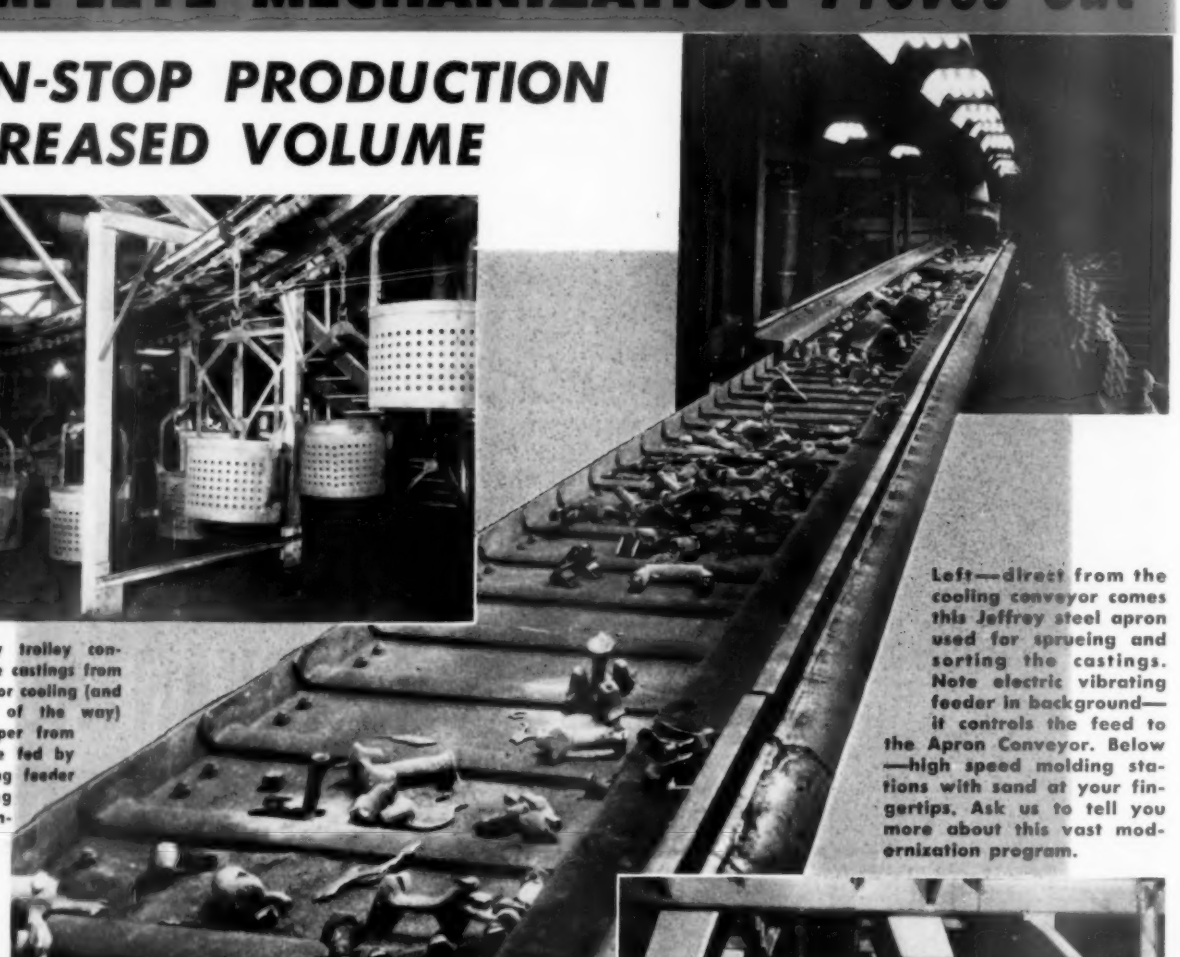
FERROCARBO Distributors: Kerchner, Marshall & Co., Pittsburgh, Cleveland, Birmingham, Philadelphia and Buffalo; Miller and Company, Chicago, St. Louis and Cincinnati

"Carborundum" and "Ferrocarbo" are registered trademarks which indicate manufacture by The Carborundum Company

COMPLETE MECHANIZATION *Proves Out*

NON-STOP PRODUCTION INCREASED VOLUME

Above—Jeffrey trolley conveyors take the castings from the shake-out for cooling (and overhead out of the way) thence to hopper from which they are fed by electric vibrating feeder to the sorting and sprueing conveyor (right).



Left—direct from the cooling conveyor comes this Jeffrey steel apron used for sprueing and sorting the castings. Note electric vibrating feeder in background—it controls the feed to the Apron Conveyor. Below—high speed molding stations with sand at your fingertips. Ask us to tell you more about this vast modernization program.

Completely modernized and Jeffrey-equipped throughout, this large Malleable Foundry has the facilities to turn out large quantities of castings quickly . . . is set up to meet today's prices. Yes, some Jeffrey unit is in there doing its bit to speed the process all along the line (see photos). And you'll like the way Jeffrey Foundry Engineers step up production . . . the way they coordinate each unit to provide peak efficiency and increased volume. A complete line of equipment to make your foundry (small or large) as modern as possible. Let us show you what we can do.

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This master pattern must have ACCURACY

Marc Andrews, head of Marco Manufacturing Company, Akron, Ohio, is a master technician who uses large quantities of HYDROCAL* Gypsum Cement.

Why HYDROCAL? *Because many of Marco's products must be executed to tolerances of less than .005 of an inch!*

HYDROCAL has been repeatedly chosen by outstanding patternmakers because it creates patterns of *outstanding accuracy*. In addition it is fast to work, dimensionally stable, and is not affected by normal shop changes in temperature and humidity. Once a super-strength HYDROCAL Gypsum Cement pattern is designed and completed, it is *always* ready for use.

A product of United States Gypsum, HYDROCAL can be adapted to practically every job in your pattern shop.

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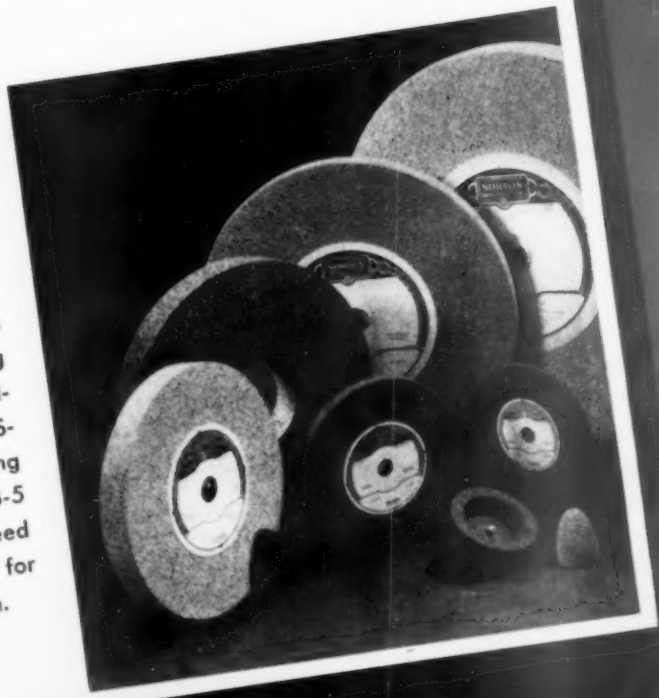
to Increase Production and to Reduce Grinding Costs?

Grinding Wheels—There's a Norton wheel that's exactly right for each of your portable, floor stand and swing frame grinding jobs, whether you're grinding castings of steel malleable iron, gray iron, brass, bronze, or aluminum. Fast, cool-cutting action is assured by three different outstanding Norton abrasives trade-marked ALUNDUM, 57 ALUNDUM, and 37 CRYSTOLON. And smooth, clean-cutting action is provided by the Norton B-5 and B-7 resinoid bonds for high-speed operations and by vitrified bonds for grinding speeds up to 6500 s.f.p.m.



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Discs—You may choose a Norton Disc of exactly the right combination of abrasive, bond, grain, grade and structure to give you fast, cool cut and extra long life on each of your surfacing jobs. They're available in a variety of sizes and with all types of mountings commonly used, including inserted nut and plate mounted.

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Mounted Wheels and Mounted Points—Excess metal in hard-to-get-at places may be removed quickly and easily with Norton Mounted Wheels and Mounted Points. They're available with fast-cutting 38 ALUNDUM abrasive for jobs on steel and steel alloys, with 37 CRYSTOLON abrasive for jobs on cast iron, chilled iron and non-ferrous metals, and in over 200 standard sizes and shapes.

Rubbing Blocks—CRYSTOLON Rubbing Blocks are popular in foundries everywhere for cleaning off sand, and removing parting lines and other slight projections from gray iron castings. Common grit sizes are 16, 20, and 24—usual grades R and S. The fluted type of block is popular when there are large surfaces to be cleaned.

Contact your Norton abrasive engineer or distributor for helpful information and wheel specifications

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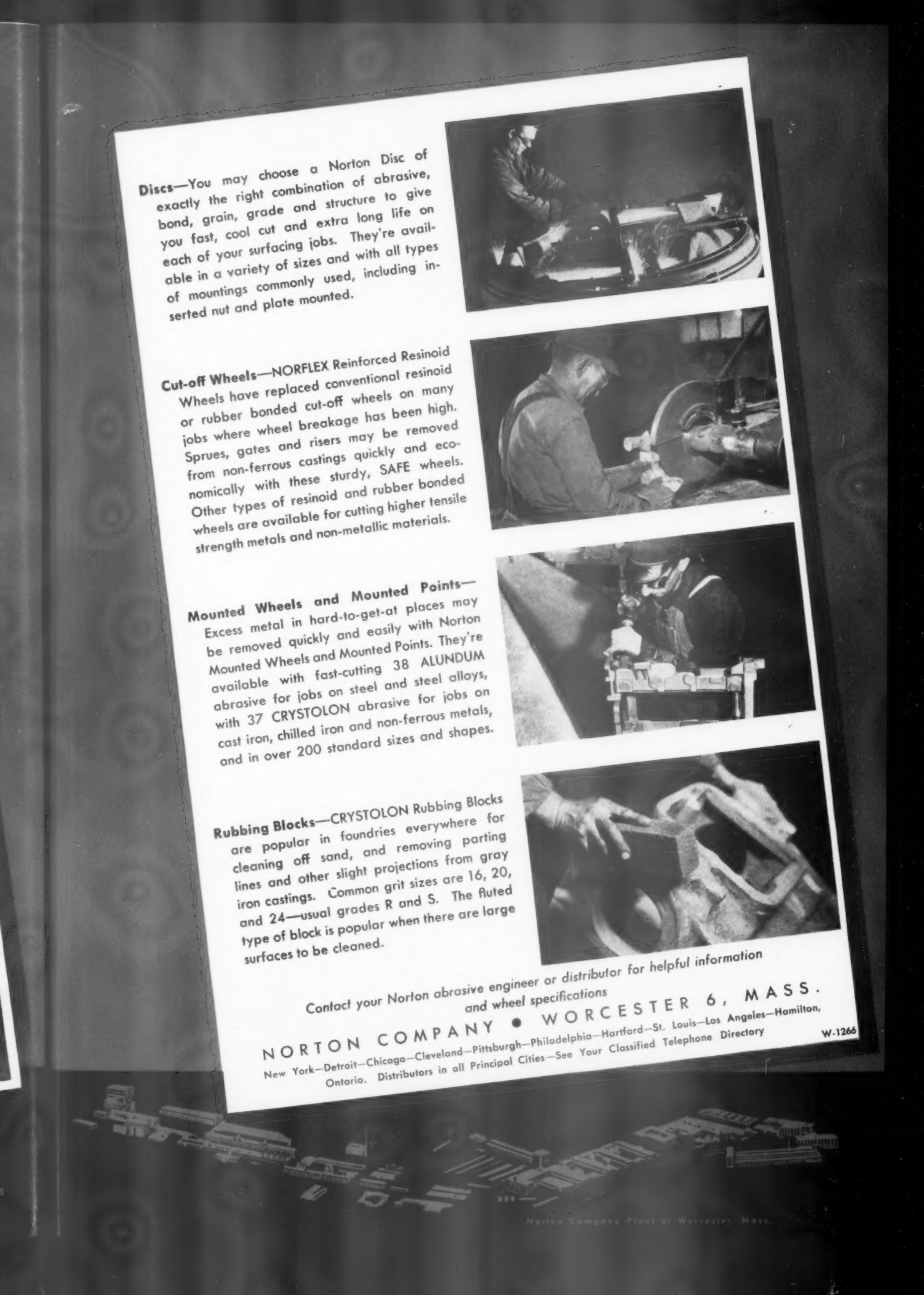

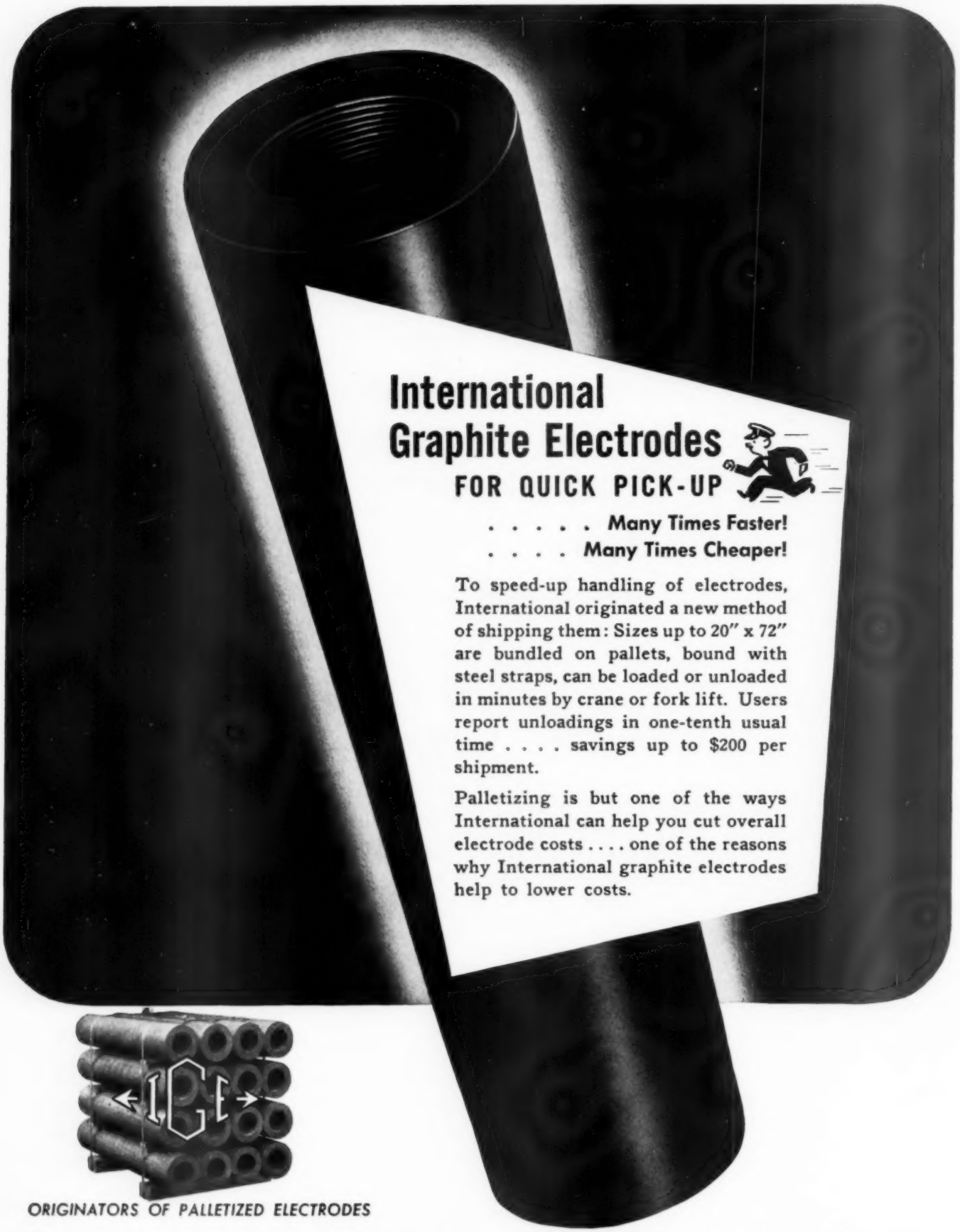
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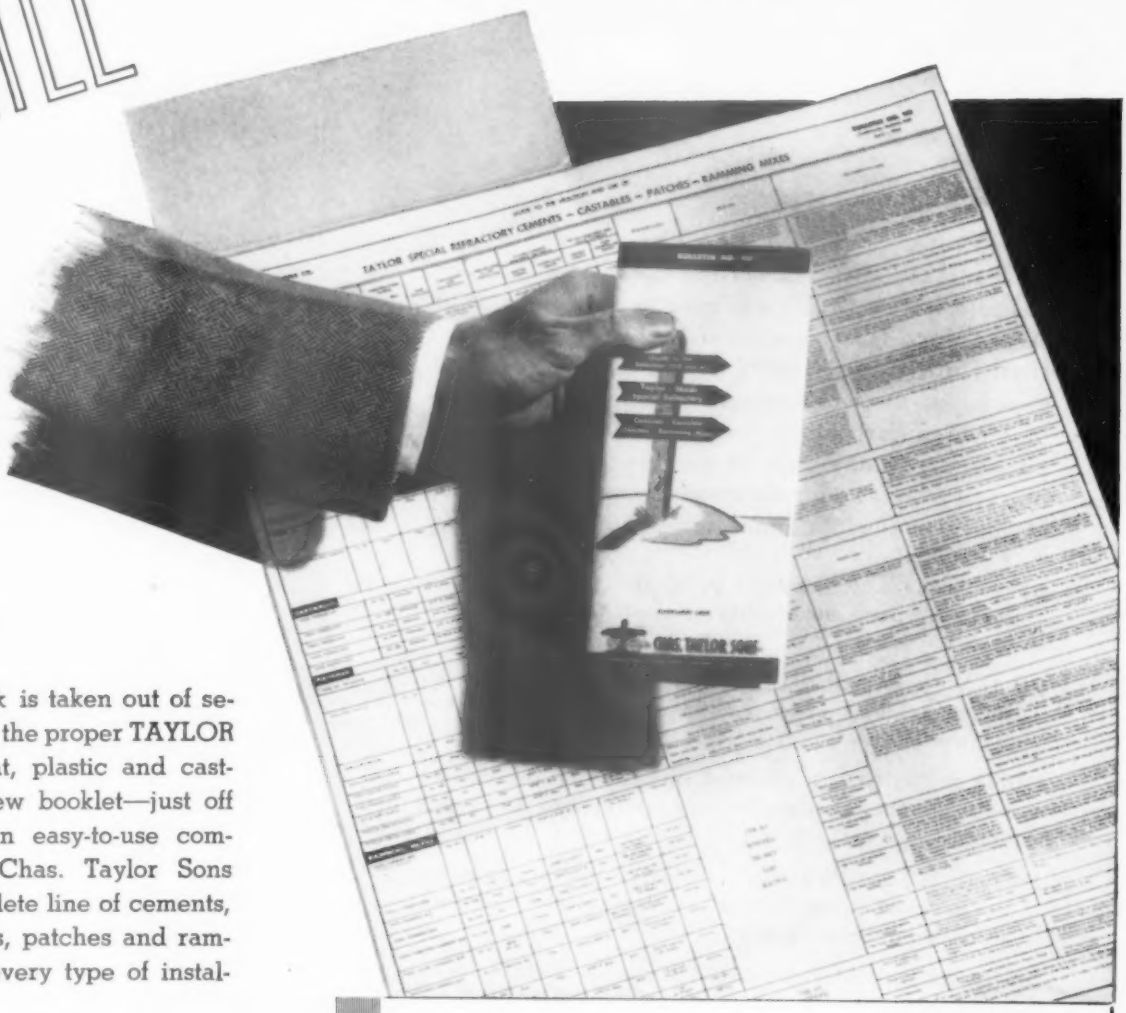

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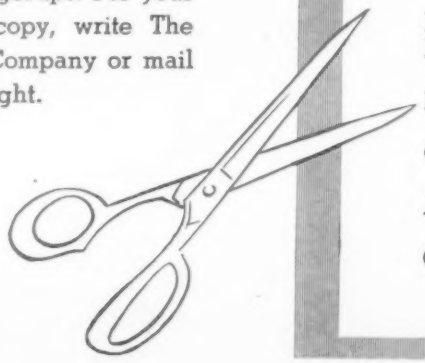
If you use refractories, you need this handy booklet on your desk. It will put all the necessary facts about selecting and using these refractory materials at your fingertips. For your free and postpaid copy, write The Chas. Taylor Sons Company or mail the coupon at the right.



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● **REDUCE YOUR OPERATING COSTS** by replacing obsolete, inefficient core and mold ovens with Coleman Ovens. Why waste money using worn-out ovens? Install Coleman Ovens which quickly pay for themselves through immediate direct savings—savings which start in the core room and molding department and end up with perfect castings! It will pay you to investigate Coleman Ovens today because of these vitally important cost-saving advantages:

DEPENDABLE BAKING AND DRYING. All guesswork in core baking and mold drying removed. Rejects and make-overs eliminated.

INCREASED LABOR SAVING. Efficient and modern mechanical designs reduce handling and other indirect labor to a minimum.

HEAVY DUTY CONSTRUCTION. Responsible for dependable performance, economical operation, and minimum maintenance cost.

MAXIMUM FUEL ECONOMY. Coleman Heating Systems use the most economical fuel available to you—gas, oil, stoker-coal, electricity, etc.

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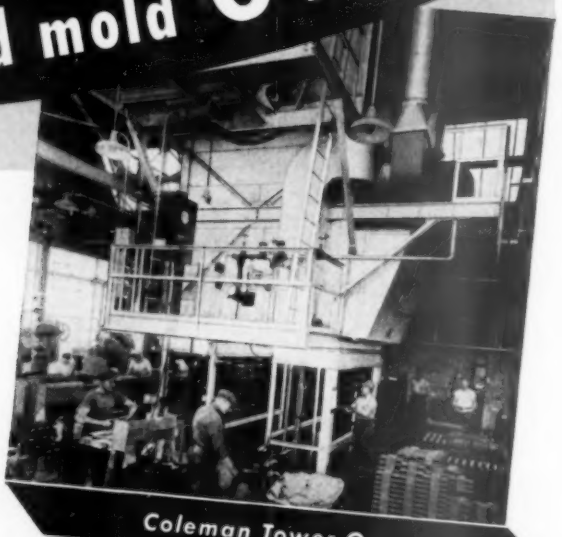
COMPLETE RANGE OF TYPES AND SIZES to meet every need.

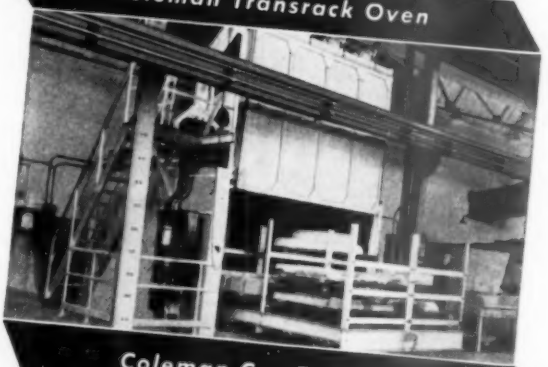
ADVANCED OVEN KNOW-HOW. Coleman Engineers have pioneered and developed the most efficient foundry oven designs. We will gladly study your operating conditions and recommend the type of Coleman Oven that will do your work at the lowest cost for fuel and labor.

Write today for Bulletin 48



Coleman Tower Oven

Coleman Transrack Oven



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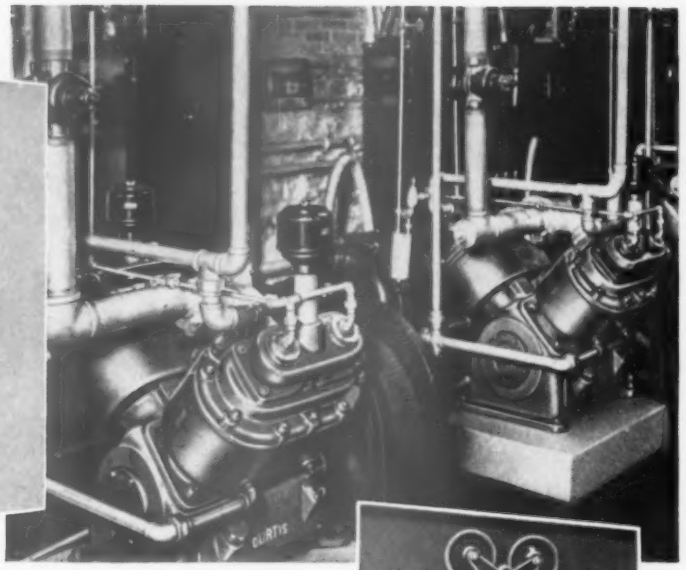


Plant after plant is turning to Curtis Air Hoists and Cylinders for pushing, pulling, lowering or lifting operations . . . and to multiple installations of Curtis Air Compressors, which eliminate long air lines, the possibility of air leaks, and losses resulting from breakdowns of central air compressor installations.

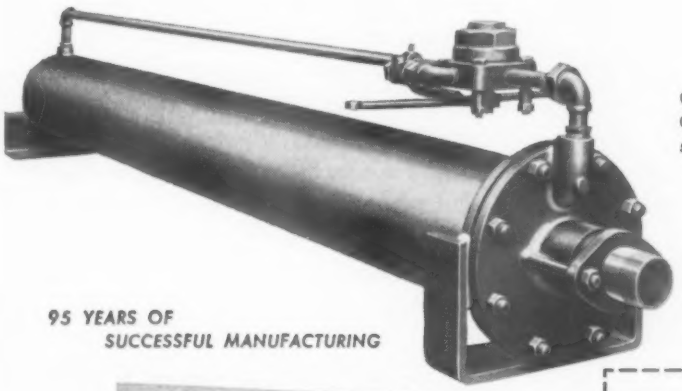
Here's why it will pay you to consider CURTIS *equipment*

AIR HOISTS AND AIR CYLINDERS

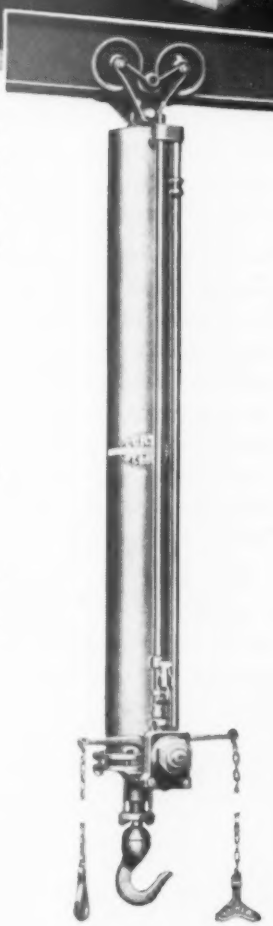
- Cannot be overloaded.
- Hoisting or lowering speed is controlled by operator.
- Ground-steel cylinder.
- Disc type valves.
- Valve automatically returns to vertical position when released.
- Can be operated by unskilled labor.

AIR COMPRESSORS

- Timken-Bearing equipped—permits external adjustment.
- Self oiling—positive lubrication.
- Precision construction throughout.
- Complete valve assembly removed or replaced in a few moments.
- Cylinder, crankcase, also heads made from gas-tight iron.
- Fully enclosed.



Curtis bracketed-type Air-Hoist Cylinder can be placed in any position from horizontal to vertical.



Curtis Pendant Air Hoist can be used for practically any lifting problem where the head room is not limited.

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You want to modernize your foundry and step up casting production! Then be sure to investigate Sterling stack molding technique. It enables you to pour ten, or even twelve, sections at a time.

In stack molding, the molds are made in flask sections stacked one above another to a height of 10 or 12 sections. A common sprue through the stack feeds the molten metal to runners leading to individual casting cavities. The increased amount of hot metal in relation to the total flask volume generates tremendous heat with a corresponding increase in gas pressure. That's why —

Sterling Steel Flasks should be used for stack molding. They are ruggedly constructed of special rolled steel to withstand terrific pressures. A reinforcing rib around the side prevents distortion and misalignment of the stacked molds. Successfully job-tested in high production foundries over a period of years. Consult Sterling for your flask requirements. Write for new Catalog No. 60 just off the press.

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Heavy Casting Needs Seen for Long Term

IN THESE times of stress and uncertainty, when inflation, deflation, strikes and their resulting shortages of raw materials, fluctuating demands for castings, and many other factors complicate the general business situation, prophesying probable future trends in foundry operations offers many hazards. But since there appears to be no prospect of an early return to the days when our business and economic picture followed a more or less historical pattern, foundrymen continue to gaze into the crystal ball in an effort to see what the future may have in store.

What seems to be the business prospects for the immediate future and for the longer pull? Settlement of the strikes in most of the steel industry and resumption of the mining of coal, at least on a temporary basis, give rise to a more optimistic short-term picture. Many foundrymen are of the opinion that the general improvement in demand for castings, which was well under way in the late summer and early fall, but which was affected somewhat adversely during the national labor disturbances in steel and coal, should resume shortly. Of course, the duration of the trend will be influenced by many variables, but numerous economists see at least six months of rising demand.

Potential demand for the products of industry during the next ten years is even brighter, according to a graphic presentation of America's needs and resources, prepared by Carskadon and Moldley of the Twentieth Century Fund and published recently by Macmillan Co. By going back 100 years and tracing increases in production to meet major wants, and developments in machines to achieve this production, the authors have been able to project the curves and to estimate the likely requirements in 1960 for a number of important fields.

Because this nation has applied inventive genius, organizing ability and many skills to the production problem, energy supplied manufacturing processes by machines grew from 6 per cent in 1850 to 84 per cent in 1930 and should reach 96 per cent in 1960. Castings contributed tremendously in the progress, and will be needed in quantities as the upward trend continues.

The study shows that during the next decade our expanding economy and the goal for an improved standard of living should bring great developments in the building of new factories and homes, slum clearance and public works of many kinds. New machinery and equipment will be needed because of obsolescence, wear and tear, and for the ever increasing markets, both in industry and the home.

Normal growth of the economy during the next ten years will create heavy demands for castings. With technical and production progress in foundries keeping pace with casting requirements, the record output of over 16 million tons of castings in 1948 may be exceeded numerous times before 1960.

Frank G. Steinebach
Editor

THE FOUNDRY—WHEREVER METALS ARE CAST

By EDWIN BREMER
Metallurgical Editor
THE FOUNDRY

Southern
Is Designed fo

PRODUCTION Foundries Division, Jackson Industries Inc., Birmingham, turning out thousands of castings hour after hour without cessation, has a well chosen name since it is truly descriptive of the operations carried on. Housed in a brick and steel-sash structure 80 x 510 ft, the foundry produces a wide variety of gray iron castings weighing from 1½ to 60 lb for automotive, agricultural implement, home appliances, veneering machines, etc., at the rate of 15 to 18 tons per hour.

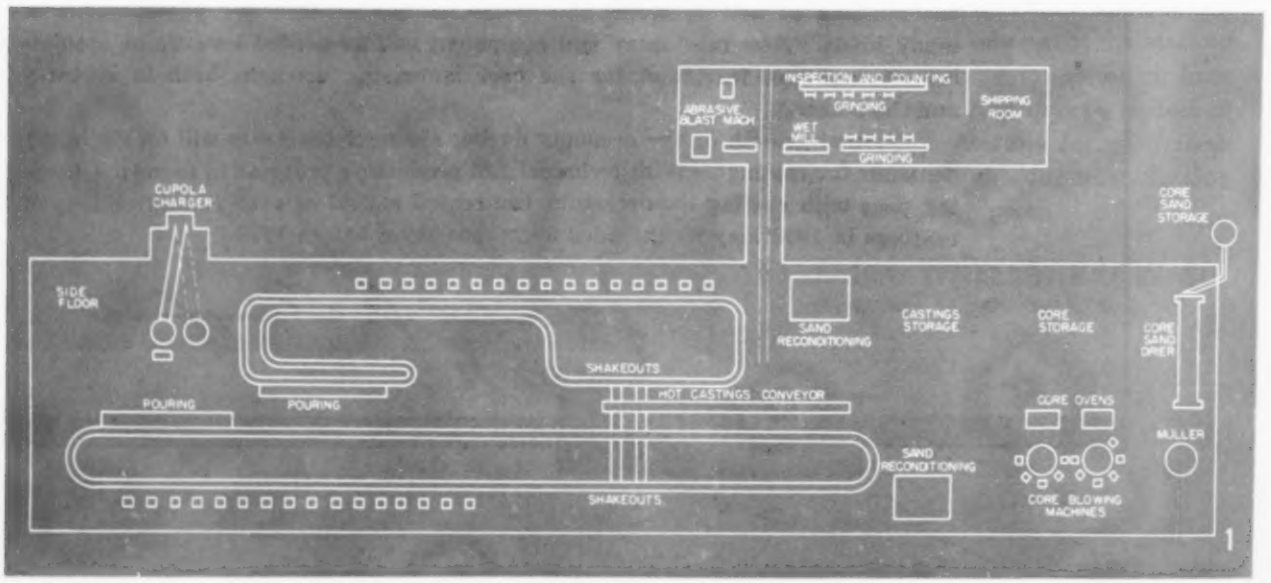
As indicated in the accompanying sketch, Fig. 1, which shows the layout of the foundry, all molding, except for a few large, odd-lot jobs, is performed on molding machines located along two continuous car type conveyor lines. The molds move at a continuous speed from the molding stations to the pouring floors. There, the iron pourers with filled ladles suspended from overhead monorail conveyors travel along escalators synchronized to move at the same speed as the mold conveyors. These escalator pouring floors facilitate pouring by reducing effort, speeding up procedure, reducing hot metal wastage, allowing more even and gentle pouring and reducing the labor required. Hot castings are shaken out by two shakeouts on each unit and pass to a 36-in. wide apron conveyor. This conveyor serves as a picking line from whence castings are separated and placed in large open-end steel boxes, holding 2 to 3 tons. Boxes when filled are picked up by a crane and moved to the casting storage department where they remain one to eight hours. Then they are loaded on cars and transported to the cleaning and finishing departments located in an adjacent building.

Iron for the castings is supplied by one of two cupolas used alternately

Fig. 1 — Sketch showing plan view of foundry of Production Foundries Division, Jackson Industries Inc., Birmingham

Fig. 2 — Cupolas are charged with a skip-hoist type unit which is arranged so that it may be swung or swiveled from one to the other

Fig. 3—Partial view of the core department showing oven at the right and rotating table at the left. Core blowing machines are located around the table



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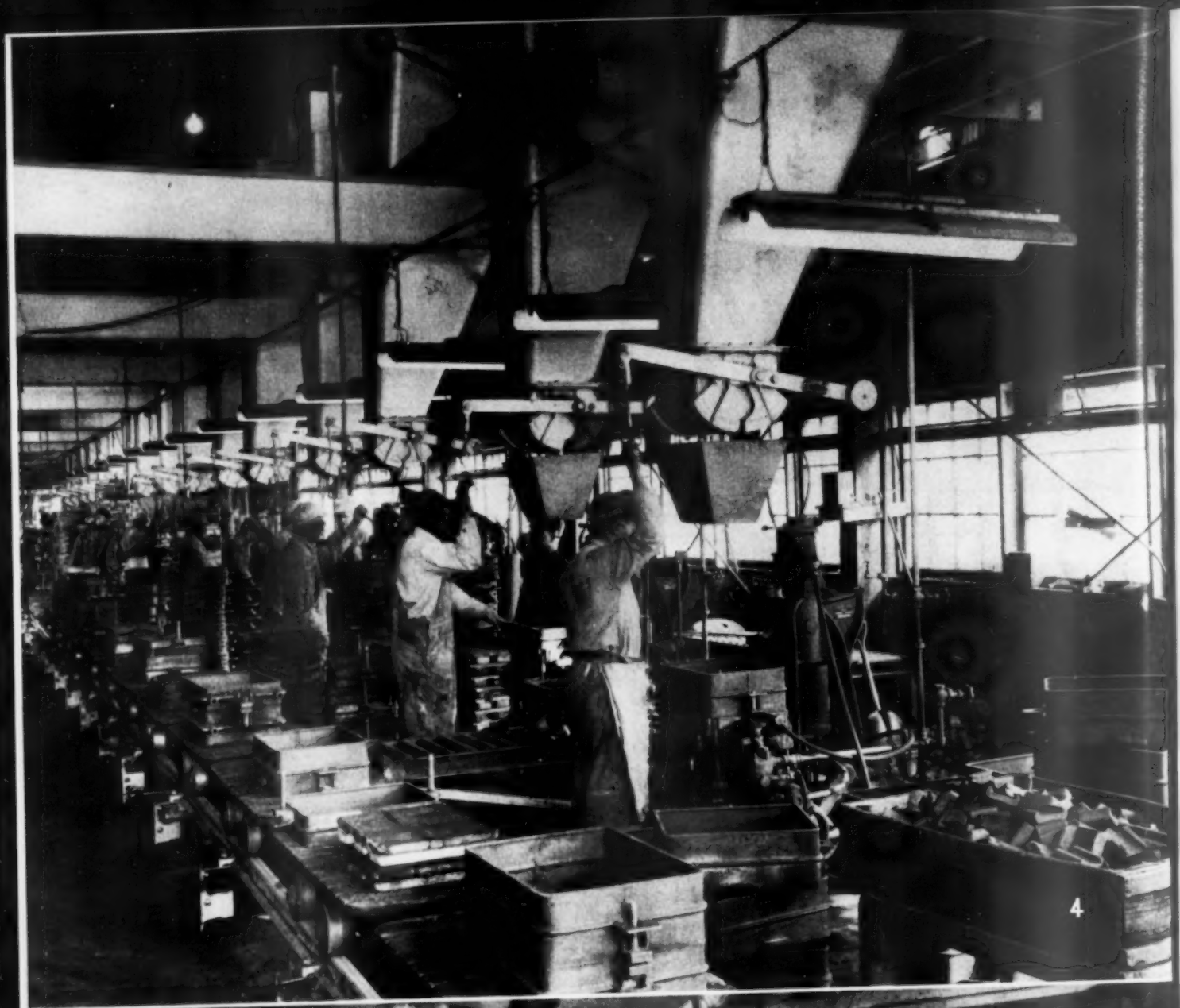

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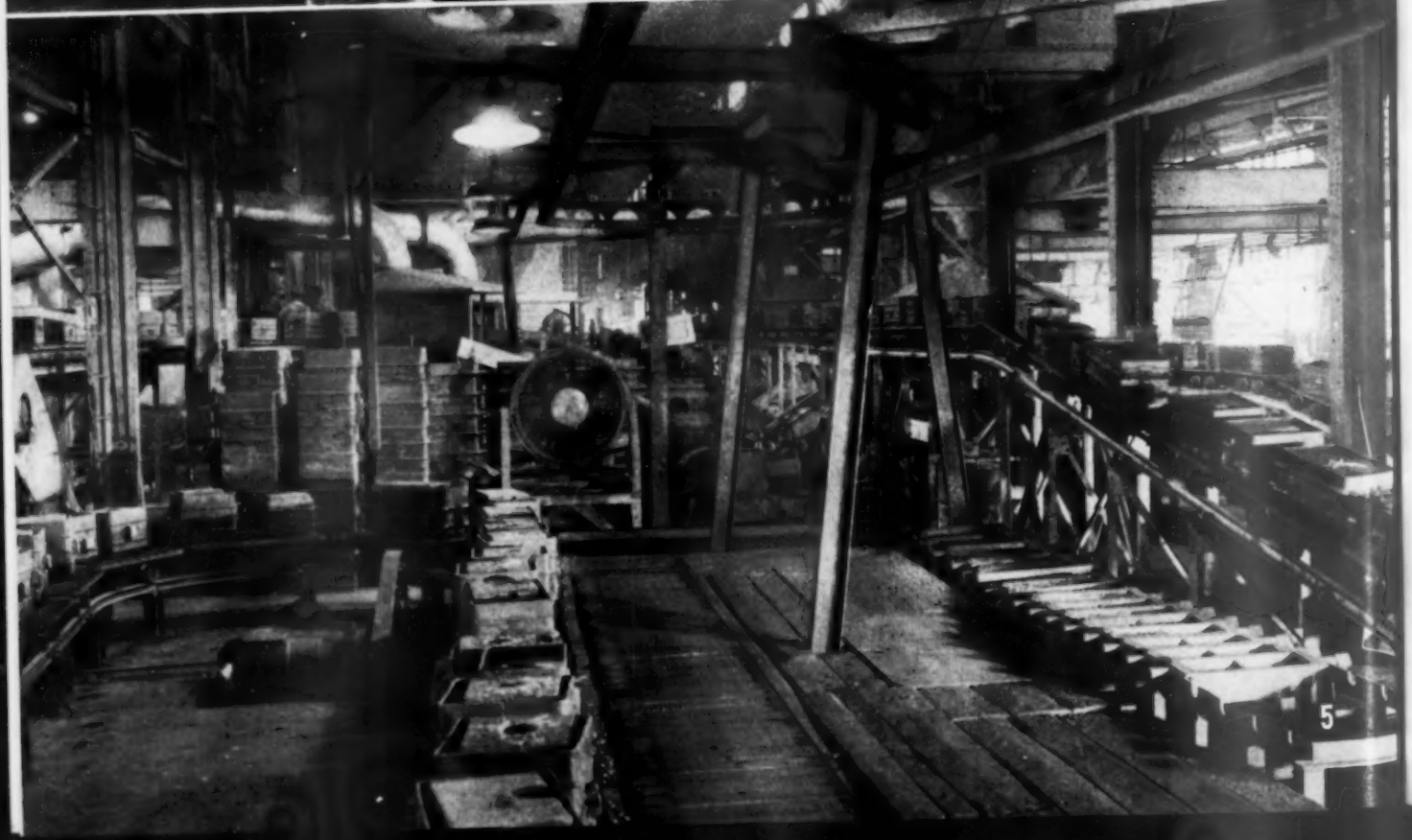

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and lined to 67 in. Six thermocouples are equally spaced in the melting zone of each cupola. These instruments, serving as a warning signal for poor patching or lining, are typical of the scientific approach to foundry problems practiced by Production Foundries. Cupolas are charged by a late-design skip hoist mechanical charger (Fig. 2) which can be indexed from one to the other as needed. Bucket used is the square-top, cone type, side-discharge with the leaves hinged at the top. Iron for the charges is picked up in the storage yard by a magnet attached to a crane and transported to the charge make-up unit. This bucket is in a pit underneath a square top steel funnel. The bucket is supported on a scale and the amount of iron dropped in is indicated on a large dial scale. Coke and limestone are placed in the same bucket on the top of the iron. Additions of ferrosilicon and ferromanganese are added to the charge as occasion demands.

Metal charges are 2200 lb, composed of returns, pig iron and steel, which can be varied to meet customer specifications. It is treated in the mixing ladle with fused soda ash to bring it down to an exceptionally low sulphur content. Additions of various alloys are made as occasion demands.

Iron Is Inoculated Through Hopper Arrangement

Iron is inoculated at the spout with ferrosiliconzirconium, which is fed through a tube from a hopper mounted on the charging platform. Bottom of the hopper is equipped with an electrically-driven adjustable worm-screw feeder to supply any desired quantity of alloy to the molten metal. Cupolas are the front-slagging type. Slag from the spout flows into a trough where it meets a stream of water which disintegrates it, and carries the slag to a settling tank just outside the foundry wall. From time to time the pulverized slag is removed from the tank by a clam shell bucket for disposal.

Ratio of coke to iron is 1 to 10, and for fluxing, 60 lb of limestone is used per charge. Cupola blast is controlled by an air-weight device, and 650 lb of air or 8500 cfm is used to melt 15 to 18 tons of iron per hour. Metal temperature ranges from 2700 to 2800° F at the spout. Close control is maintained on cupola operations through numerous tests. Chill test bars, 4 x 1¼ x ¼ in., are made and examined every hour; chemical analyses for total carbon, silicon and sulphur are made every hour, and phosphorus and manganese also every hour. Brinell hardness number determinations are made every hour on a 2 x 6-in. step bar with sections ¼, ½, and ¾-in. thick. Standard ASTM arbitration test bars, 1.2-in. in diam and 21-in. long, are cast several times a day for determination of tensile strength, transverse load, and deflection.

As indicated in Fig. 1, molding is accomplished on two continuous car type conveyor lines. One line extends along the foundry wall and parallel to it, while the other, due to space limitations, had to be doubled back along part of its length. The long straight conveyor line is approximately 600 ft long and equipped with 120 cars, 4 ft 6 in. long and 20 in. wide. The other is about 486 ft long (*Please turn to page* 249)

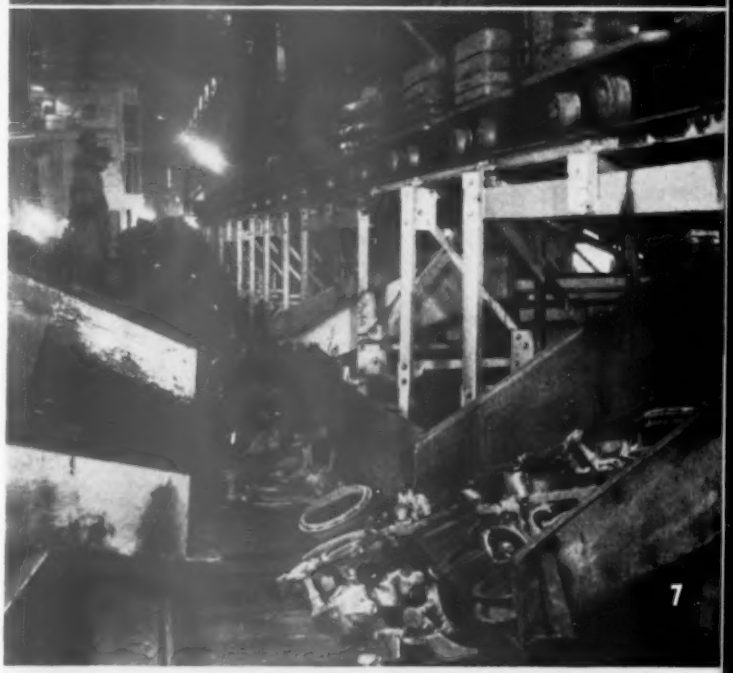
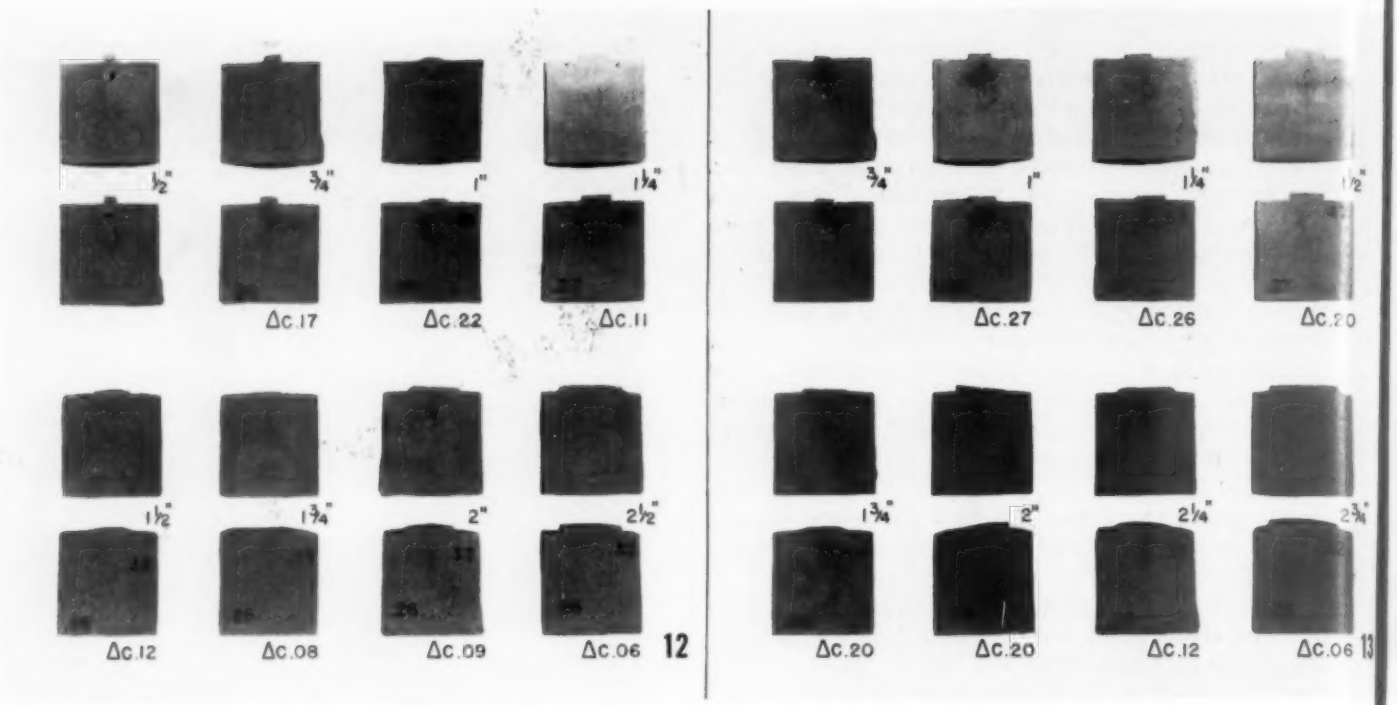


Fig. 4—Molding machine stations along one of the conveyor lines which is 600 ft long. Sand storage hoppers are equipped with vibratory units to agitate the sand when the discharge gate is opened

Fig. 5—Moving platforms synchronized with the conveyor lines are used along the pouring stations

Fig. 6—One of the pouring lines in action

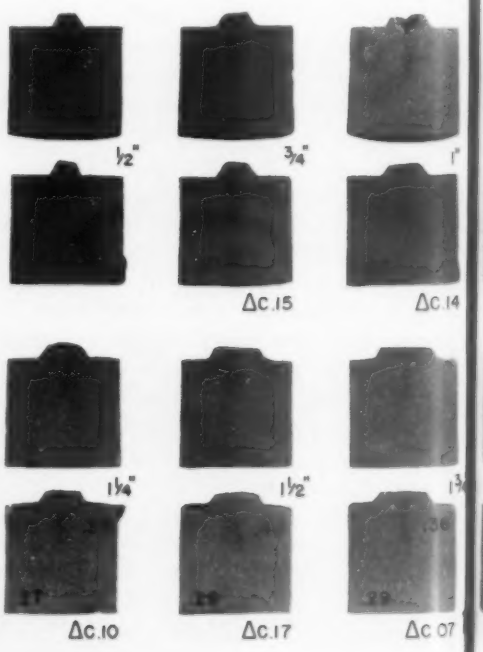
Fig. 7—Castings are shaken out while still hot on vibrating grate shakeout units. Units are in pairs so that in case of breakdown one always is available



Figs. 12-15—Sectioned and etched castings with cylindrical contacts. Neck diameter and carbon contents as indicated. Fig. 12—½-in. core. Fig. 13—¾-in. core. Fig. 14—1-in. core. Fig. 15—1½-in. core

Segregation *In Small Steel*

By HAROLD F. BISHOP
Naval Research Laboratory
Washington

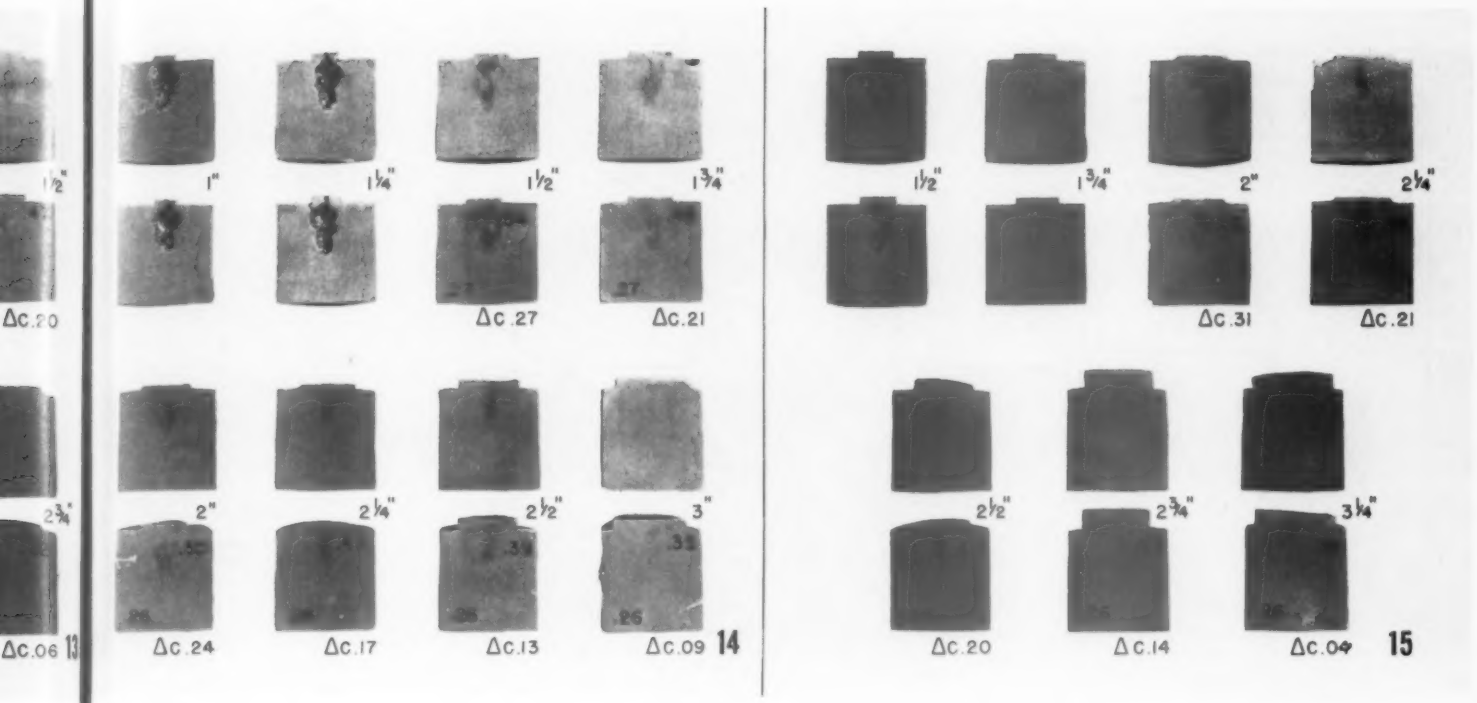


A MORE complete study was made on 4-in. diameter, 4-in. high test castings to determine how carbon segregation beneath knock-off risers varied quantitatively with neck length, neck diameter, and neck shape.

Cores of four different thicknesses—½, ¾, 1, and 1½ inch—were used to form the riser necks. Cylindrical and tapered neck openings, as shown in Fig. 20, were employed with each core thickness. The test blocks were made as shown in Fig. 19 with four castings in each flask gated from a central sprue and fed individually by risers 5 in. in diameter and 5½ in. high. Small permeable sand cores were inserted into the completely enclosed risers to permit atmospheric pressure to act on the molten metal within the riser. The use of top blind risers in this manner permitted simultaneous pouring of four castings of different neck design with equal amounts of metal flowing through each neck. It also gave assurance that no pipe eliminator, from which carbon might be absorbed, would be placed on the risers.

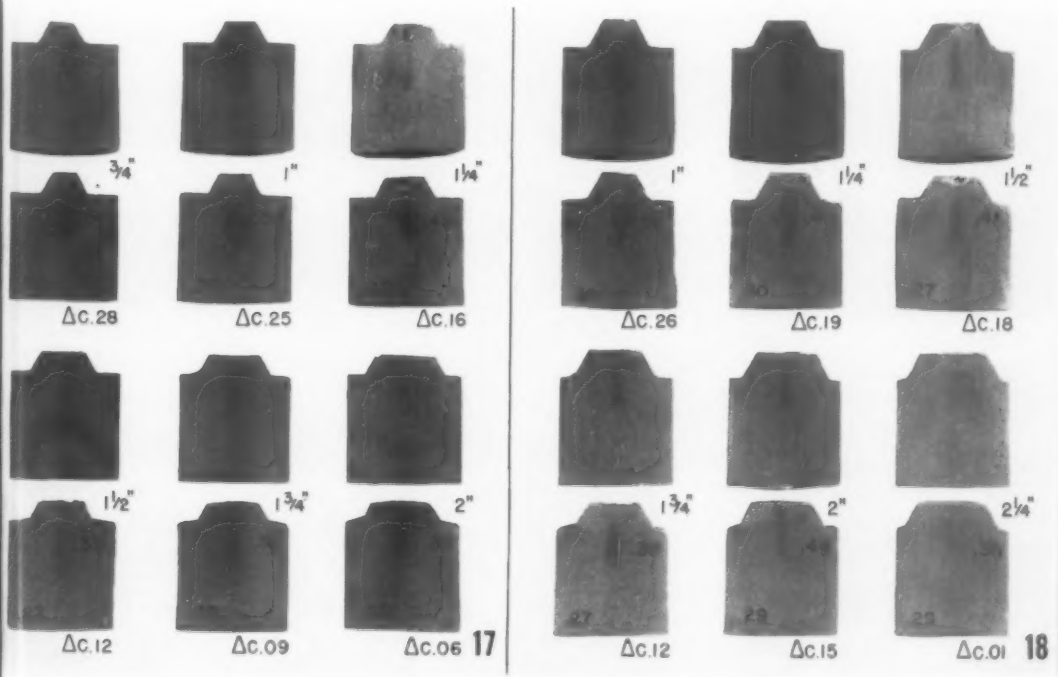
All castings were poured of Navy Class B steel at temperatures between 2900°F and 2950°F. They were annealed at 1650°F for 4 hours, then sectioned and etched with a 10 per cent ammonium persulphate solution to delineate the high-carbon areas.

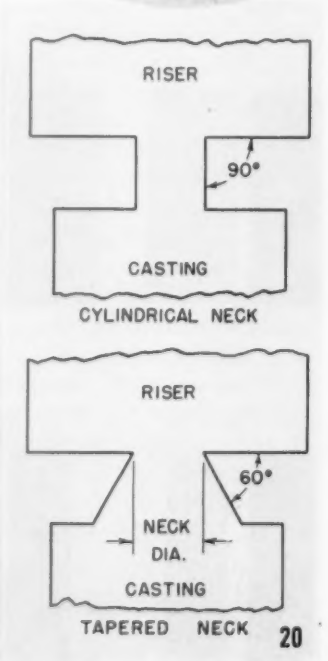
Figs. 12 through 18 illustrate the effect of varying neck



In this second and concluding article discussing segregation of carbon in small steel castings adjacent to riser contacts, the author covers effect of riser contact design, use of exothermic and special knock-off riser cores, and effect of casting design

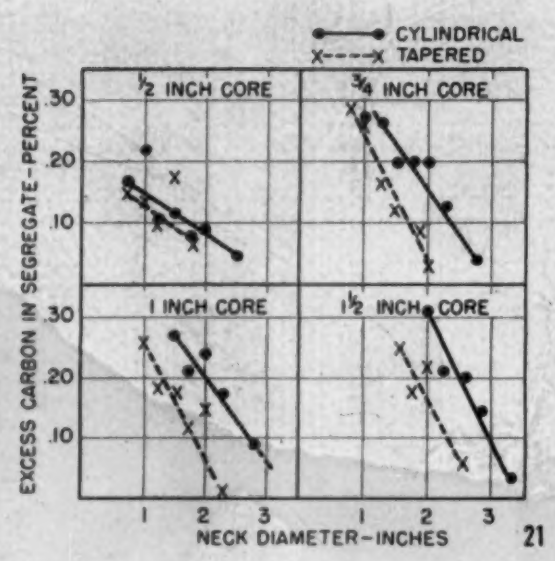
Fig. 19 — Test castings, as removed from mold, showing gating and riser-ing practice





Figs. 16-18—Sectioned and etched castings with tapered contacts. Fig. 16—½-in. core. Fig. 17—¾-in. core. Fig. 18—1-in. core

Fig. 20 — Contact neck types used



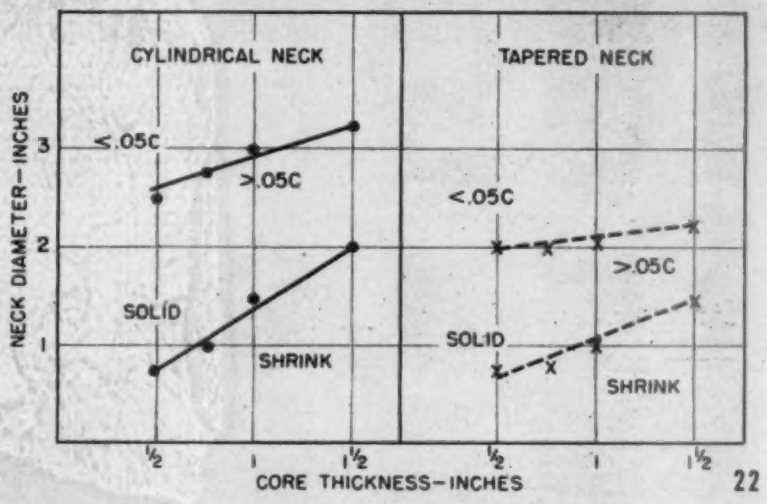


Fig. 21—Relation of segregation to neck type, core thickness (neck length), and neck diameter in 4-in. diameter cylinders

Fig. 22—Relation of core thickness and neck diameter required on 4-in. diameter cylinders to (1) produce sound castings and (2) keep segregation less than 0.05 per cent carbon

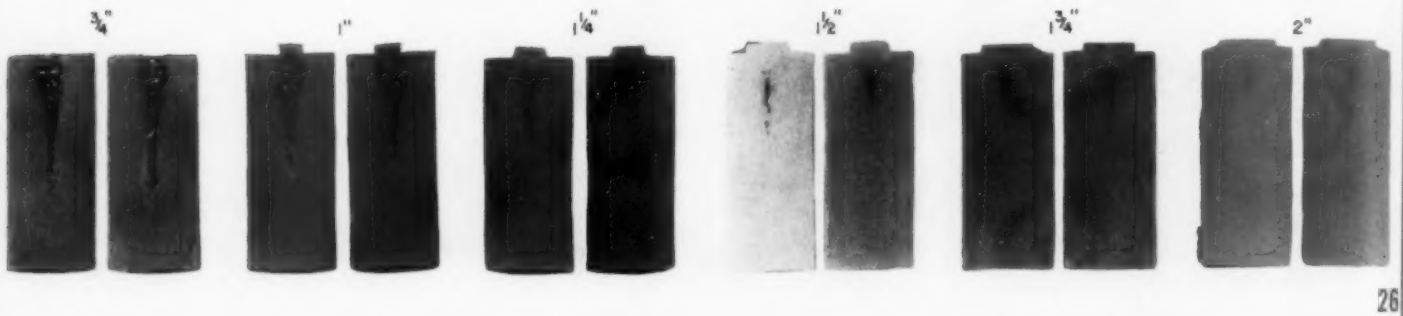
Fig. 23—Special core used to form knock-off riser contacts. Core diameter and diameter of opening can be made any desired size

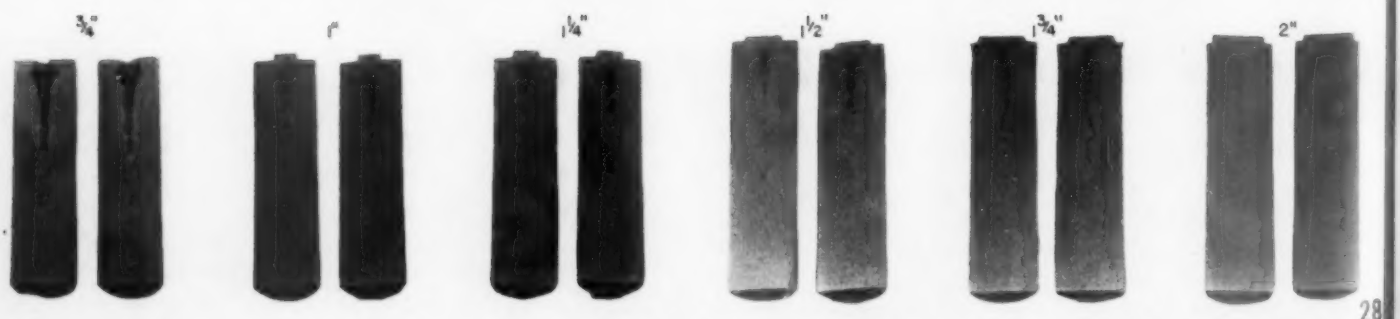
Fig. 24—Sectioned and etched castings showing how segregation can be reduced by use of exothermic cores

Fig. 25—Section through casting and riser made with core shown in Fig. 23

diameter with constant core thickness and neck shape. The neck diameters, the carbon contents at the segregated and normal regions, and the carbon variation (ΔC) between these regions are indicated on the photographs of each casting. The carbon contents were determined from chips made by drilling a $\frac{3}{8}$-in.-diam hole to a depth of approximately 3/16-in.

In Fig. 21, carbon segregation is compared with neck diameters for various combinations of core thickness and neck shape. The neck diameters for the castings made with the tapered necks refer to the smallest diameter of the necks, and for this reason they appear to be superior to the cylindrical necks in minimizing carbon segregation. Actually, if the av-





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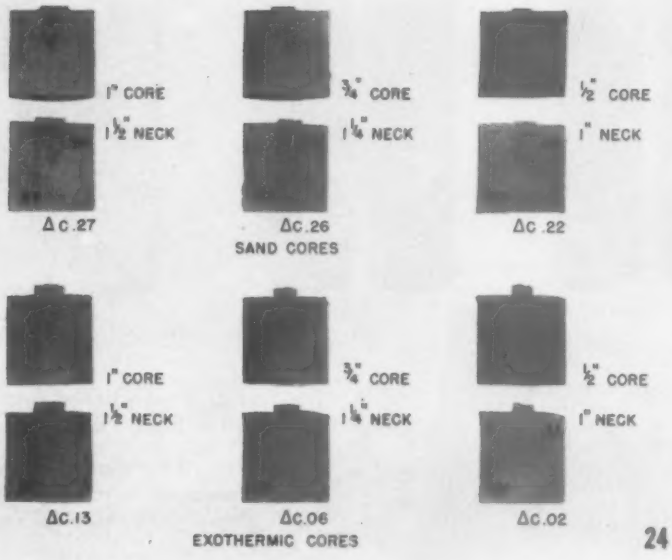

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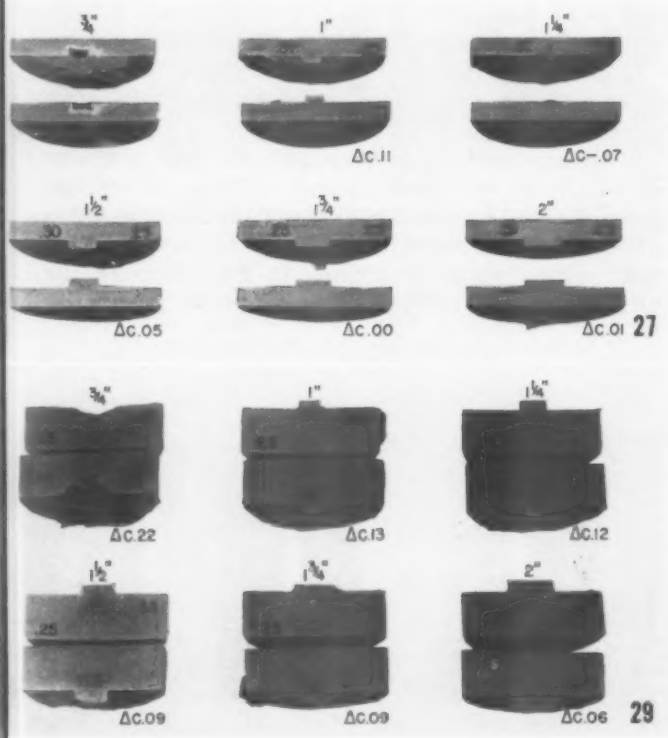
erage diameter of the tapered necks were plotted, the curves for the two types would very nearly coincide. The smallest diameter of the tapered necks is used in this report, however, since this nomenclature had been adopted by the Steel Founders' Society of America.

From Figs. 12 through 18, it can be observed that, with the smallest neck diameter in each series, a shrinkage cavity generally appears in the casting below the neck. At somewhat larger neck diameters, the shrinkage cavity is replaced by a region of segregated metal; and as the neck diameter is further increased, the severity of the segregated region decreases. The amount of carbon segregation also decreases as the neck length decreases, the latter being determined by the core thickness. For example, in Fig. 21, with a constant neck diameter of 2 in., the amount of carbon variation in the castings with the cylindrical necks ranged from 0.30 per cent with a 1½-in.-thick core to below 0.10 per cent with a ½-in.-thick core.

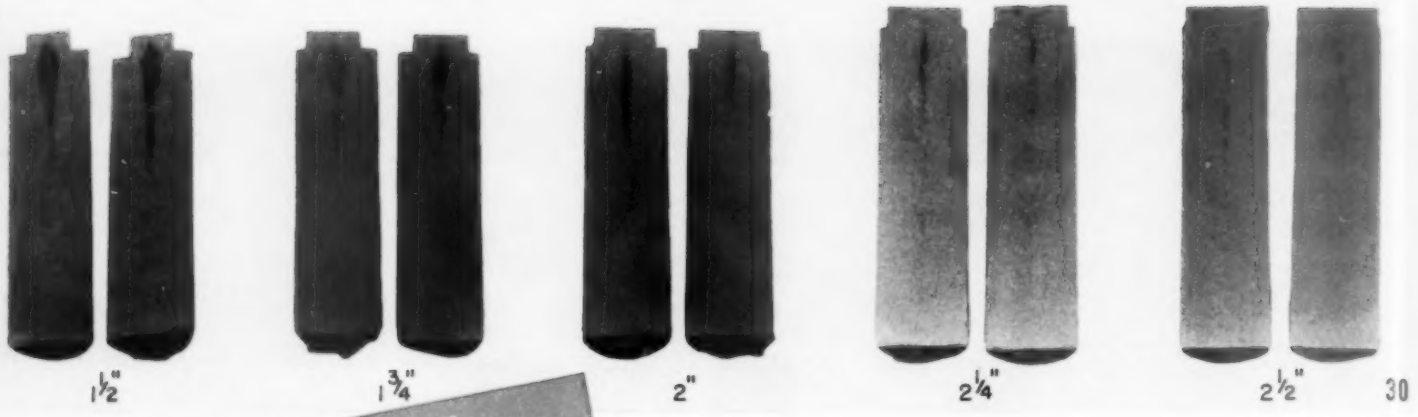
The curves in Fig. 22 show, on the one hand, the minimum neck diameters required to make this particular casting sound when various core thicknesses are used and, on the other, the minimum neck diameters necessary to limit the carbon content of the segregated area to within 0.05 per cent of the base metal carbon. Thus, with a ½-in.-thick core, a sound casting will require only a ¾-in.-diam cylindrical neck, but in order to keep the difference in carbon between the base metal and the segregated metal below 0.05 per cent, a 2½-in.-diam neck must be used. Unfortunately, when the neck diameters are increased to the indicated dimensions (upper curves of Fig. 22), the risers may no longer be knocked off with a sledge but must be removed by burning.

Exothermic Knock-off Riser Cores—It has been observed that less segregation results when oversize risers are used because then the core is thoroughly preheated by larger quantity of metal flowing through the neck opening. In other words, the core which forms the riser contact may be considered as a mild chill which changes the temperature gradients from the casting to the riser. By preheating the core, its chilling effect could be minimized. It was reasoned, therefore, that less segregation would result if the core were made of an exothermic material so that it could itself supply a large part of the heat neces-



26 27 28 29

Figs. 26-29—Sectioned and etched castings. Neck diameters and carbon contents as indicated. Fig. 26—3-in. diam, 7 in. high, ¾-in. core. Fig. 27—8-in. diam, 1-in. high, ¾-in. core. Fig. 28—2½-in. diam, 10 in. high, ¾-in. core. Fig. 29—6-in. diam, 2 in. high, ¾-in. core



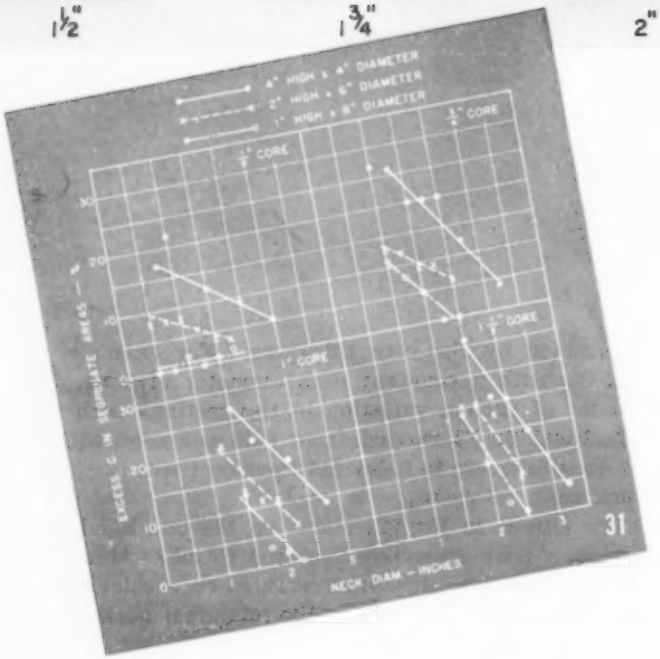


Fig. 30—Sectioned and etched castings, 2½-in. diam, 10 in. high, 1½-in. core. Neck diameters as indicated

Fig. 31—Relation between segregation and neck diameter in castings of different thicknesses but of equal volumes. All castings fed by 5-in. diam riser

Segregation

sary to bring it to the interface temperature.

That segregation can be minimized by such means is shown by a comparison of the upper and lower rows of sectioned and etched castings, in Fig. 24. For example, the carbon variation in a casting fed through a 1½-in.-diam neck, made in a 1-in.-thick core, is reduced from 0.27 to 0.13 per cent by substituting an exothermic core for the sand core. An identical test casting fed through a 1-in.-diam neck formed by a ½-in.-thick exothermic core was practically free of carbon segregation.

Special Riser Cores—The special sand core design shown in Fig. 23 is a type used frequently in the Naval Research Laboratory foundry to form riser necks on experimental steel castings. The neck diameter is made to any desired size without changing the basic design of the core. This core permits short neck lengths to be used without deformation of the core by the pressure of the liquid steel. Bulging of the core when the metal flows against it is a common occurrence when thin cores of uniform thickness are used. The greater thickness of this core at its outer edges not only gives the necessary strength and rigidity to the core but, as can be seen in Fig. 25, also allows adequate space between the casting and outer edge of the riser for easy removal of the latter. If the space between the casting and riser is too small, the riser neck cannot be bent enough during the flogging operation to cause it to break.

Less segregation is formed in the castings when this core is used to form riser necks than when the core types of Fig. 20 are used. The amount of segregation formed in the 4-in.-high, 4-in.-diam test blocks is only between 0.05 and 0.10 per cent carbon regardless of the size of neck opening used. As the neck opening in the core is increased, the neck length necessarily becomes greater and the amount of segregations shows little change.

Segregation in Relation to Casting Design—Segregation studies were made on cylindrical castings of different shapes. Although these castings had different surface areas, they were selected to contain approximately the same volume as the 4-in.-diam, 4-in.-high castings. Dimensions of the various castings studied were 8 in. in diam, 1 in. high; 6 in. in diam, 2 in. high; 3 in. in diam, 7 in. high; and 2½ in. in diam, 10 in. high. Figs. 26 to 29 shows one series of each of the different casting designs where the neck diameter was varied while the core thickness was held constant.

In the castings where the segregated zone was sufficiently large and concentrated, drillings for carbon analyses were obtained and the quantitative relation between carbon segregation and neck diameter for each casting shape is plotted in Fig. 31. As the thickness of the casting (*Please turn to page* 154)

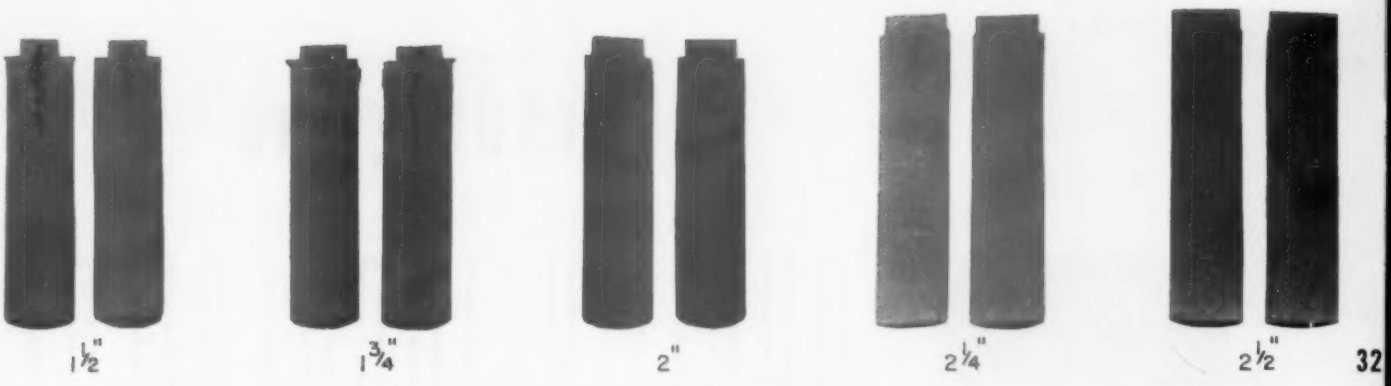


Fig. 32—Sectioned and etched castings, 2½-in. diam. 10 in. high, top gated, 1½-in. core. Neck diameters as indicated

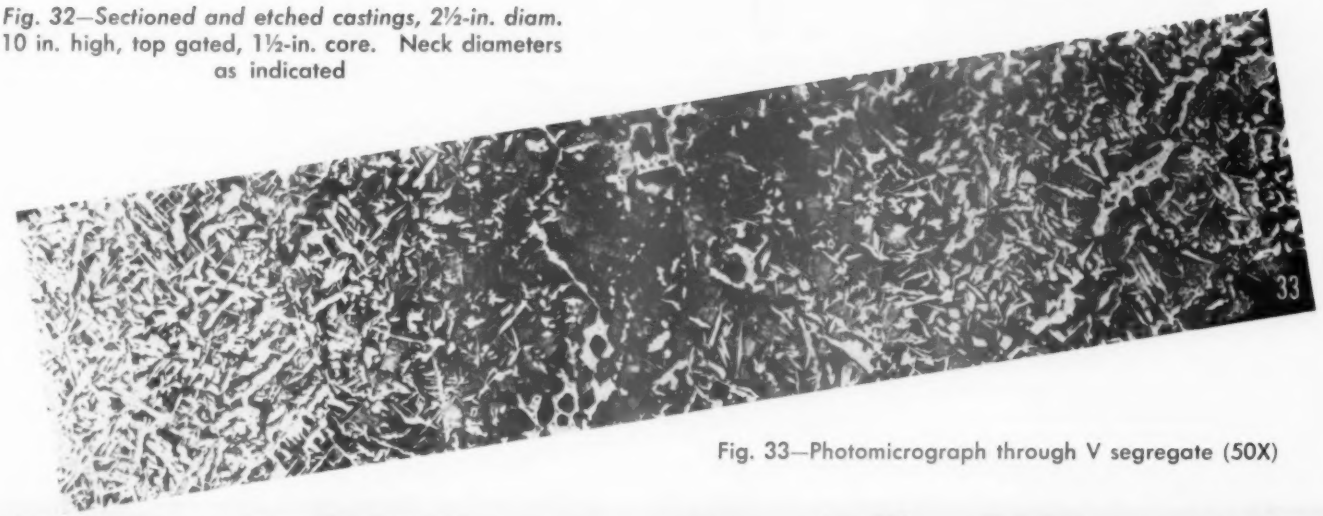


Fig. 33—Photomicrograph through V segregate (50X)

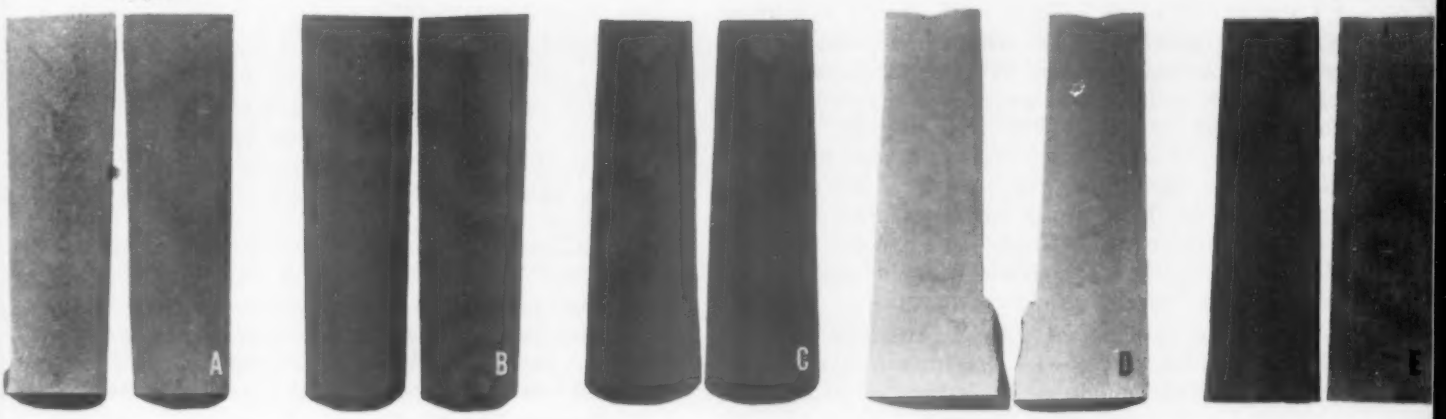
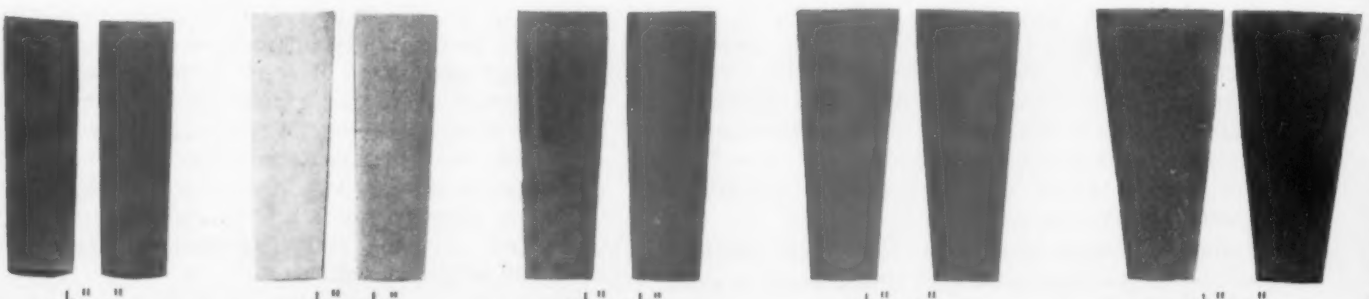


Fig. 34—Sectioned and etched castings showing that orientation of V segregation is dependent only upon riser position. (A) Top riser, bottom gate. (B) Top riser, top gate. (C) Inverse taper, top riser, top gate. (D) Bottom riser, bottom gate. (E) Cast in horizontal position, riser at large end

Fig. 35—Sectioned and etched tapered castings 10 in. long. Bottom gated and with bottom and top diameters as indicated, showing how shrinkage and segregation are influenced by taper



Pursuing the "QUALITY INGREDIENT"

By HARRY B. SWAN
Foundry Consultant
Detroit

Drawing on his long experience in the foundry industry, the author points out various factors to be watched and controlled in the attempt to incorporate the factor of quality in castings

A WELL known manufacturer of drugs, through advertising media, declares, "The priceless ingredient of every product is the honor and integrity of its maker." For the foundryman, this perhaps could be altered to read, "The priceless ingredient of castings is that quality which the producer adds to make them sound and free from defects." The lack of such an ingredient too often is revealed in the machine shop. From this it is not to be inferred that the maker of the castings lacks integrity, for generally it is more costly to him to leave out the quality ingredient than to include it. As a rule, he has no intention or desire of leaving it out.

Quality is an illusive factor in castings. The dictionary defines quality as a "peculiar power or property; a distinguishable characteristic or nature." At any rate, it is a valuable asset to the reputation and bank account of any foundry. It is something hard to get and easy to lose.

With a return of conditions to a period where the demand for castings more nearly approaches normalcy, the buyer becomes more insistent on a quality product, and on the foundryman meeting standards called for by the engineer. The factor of "quality" becomes an important item along with price as competition broadens. The writer has listened to some interesting discussions on this subject by users of large tonnages of castings and they are asking, "How and where can we obtain better castings?" Generally speaking, by better castings they mean castings which will meet specifications and which will be free from hidden defects which are uncovered in machining and manufacturing processes.

Examples of such defects are: Hard spots, shrinks, leaks, gas holes, cracks, lack of finish, poor locating points and others. Some of the excuses arising from the immediate postwar period, such as lack of pig iron, inferior scrap, poor coke, etc., no longer find the buyer sympathetic.

A brief discussion of some of the factors involved in the problem may be of interest to foundrymen who are earnestly endeavoring to produce high-grade castings, and perhaps to some buyers as well. In general, it refers more particularly to foundries producing repetitive work in reasonably large amounts. It should be borne in mind that castings showing a high percentage of defects after the consumer has processed them through part or all of the operations required are only a source of expense and may be the cause of inability to meet schedules of more important units. In addition such castings are, of course, a total loss to the foundry which produced them save for the remelt value.

The buyer is not entirely blameless. He should use care in the choice of the casting source. He should, by a thorough investigation, make sure the foundry under consideration as a supplier is properly equipped physically and in its organization and experience to meet the standards specified for the product. The smart buyer will often "give" on price to be more assured of better and uniform quality. He should be willing to pay a premium on castings known to be inherently difficult to make and carrying a high percentage of rejects; for special properties or added operations. Finally, he should remember that the foundry process is probably still considered an art, although in most cases there is a considerable admixture of science. It is a process subject to many variables, some of which are difficult and expensive to control; a little further on some of these variables will be considered.

During the war, the (*Please turn to page* 209)

Use of HARDENERS in Producing ALUMINUM ALLOY CASTINGS

By JAMES D. KLINE
Production Engineer
Niagara Falls Smelting & Refining Division
Continental Copper & Steel Industries Inc., Buffalo

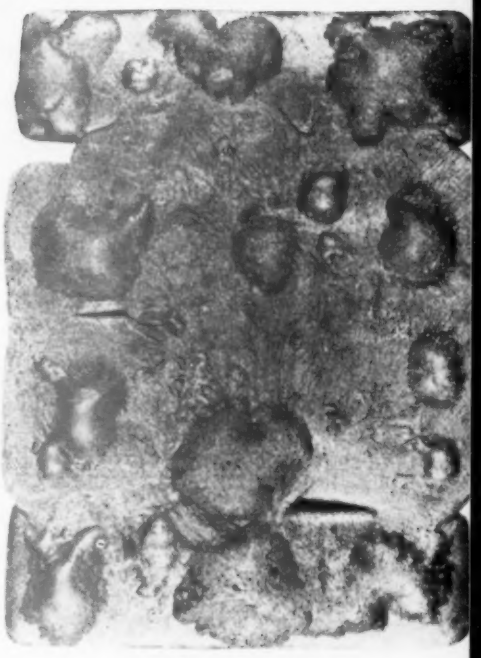


Fig. 1—Eutectic blisters occur on hardener ingot (20 per cent Fe-Al) when metals have limited solubility in each other in solid state

HARDENERS, or—as some foundrymen prefer to term them—rich alloys, master alloys, or intermediate alloys, now are recognized as important in aluminum metallurgy. This is particularly true since the advent of World War II, when intensive research in aluminum and light metals resulted in the development of many new alloys.

When we speak of hardeners we refer to those alloys or combinations of metals which are prepared rich to assist in the addition of various elements to aluminum. To clarify a common misconception, hardeners do not necessarily "harden" aluminum as the name implies, but may be added to promote grain refinement, corrosion or heat resistance etc.

As a rule, hardeners are combinations of aluminum with relatively high melting point metals or elements which would not dissolve readily in aluminum in the pure state. However, they also are valuable in making definite additions of easily oxidized elements, such as magnesium and calcium. While these hardener alloys have no commercial value when used directly, some of their properties are interesting and worthy of note. Copper and aluminum, two metals which are ductile in the pure form, when alloyed in 50-50 proportions will produce a product which is brittle and will break like glass when struck with a hammer. Many hardeners may be easily broken facilitating weighing of charges.

Some hardeners, such as 20 per cent iron-aluminum, 5 per cent titanium-aluminum, or 30 per cent silicon-copper, will contain small blisters on the surface of the ingot. These are known as eutectic blisters. The eutectic composition of a binary alloy is that combination or percentage of two metals where two descending (*Please turn to page* 222)

TABLE I—Comparison of Solubility Range of Several Binary Aluminum Hardeners with Melting Points of Pure Metal

Pure Metal	Hardener	Melting Point of Pure Metal ° F.	Solubility Range of Hardener ° F.
Chromium	10% Chromium-aluminum	2822	1222-1720
Cobalt	10% Cobalt-aluminum	2714	1215-1680
Copper	50% Copper-aluminum	1981	1018-1070
Iron	20% Iron-aluminum	2795	1211-1800
Nickel	20% Nickel-aluminum	2646	1184-1470
Silicon	50% Silicon-aluminum	2600	1071-1920
Titanium	5% Titanium-aluminum	3272	1229-2048
Manganese	25% Manganese-aluminum	2268	1216-1870
Aluminum		1214	

TABLE II—Nominal Composition of Twenty Aluminum Casting Alloys

Alloy Number	Per Cent of Alloying Elements, Aluminum and Impurities Balance Copper	Silicon	Magnesium
13	..	12	..
43	..	5	..
45	..	10	..
85	4	5	..
108	4	3	..
A-108	4.5	5.5	..
C-113	7	3.5	..
122	10	..	0.2
138	10	4	0.3
195	4.5	0.8	..
B-195	4.5	2.5	..
212	8.0	1.2	..
214	..	..	3.8
B-214	..	1.8	3.8
319	3.5	6.0	..
A-334	3.0	4.0	0.3
355	1.3	5.0	0.5
356	..	7.0	0.3
360	..	9.5	0.5
380	3.5	9.0	..

TABLE III—Charges for Preparing Standard Casting Alloys Using Three Hardeners and Aluminum

Alloy	Aluminum	Pounds of Alloying Ingredients 50% Cu-Al	50% Si-Al	10% Mg-Al
13	76	..	24	..
43	90	..	10	..
45	80	..	20	..
85	82	8	10	..
108	86	8	6	..
A-108	80	9	11	..
C-113	79	14	7	..
122	78	20	..	2
138	69	20	8	3
195	89½	9	1½	..
B-195	86	9	5	..
212	81½	16	2½	..
214	62	..	..	38
B-214	58½	..	3½	38
319	80½	7	12½	..
A-334	84	6	7	3
355	82½	2½	10	5
356	83	..	14	3
360	76	..	19	5
380	75	7	18	..

TABLE IV— Charges for Making Casting Alloys With No. 195 Aluminum and Three Hardeners

Alloy	No. 195	Pounds of Alloying Ingredients 50% Si-Al	50% Cu-Al	10% Mg-Al
85	91	9	..	..
108	95	5	..	..
A-108	89	10	1	..
C-113	88	6	6	..
B-195	96	4	..	..
12	91	1	8	..
319	89	11	..	..
380	83	17	..	..
122	86	..	12	2
138	77	7	13	3

TABLE V—Charges for Making Casting Alloys With No. 43 Aluminum and Three Hardeners

Alloy	No. 43	Pounds of Alloying Ingredients 50/50 Si-Al	50/50 Cu-Al	10% Mg-Al
13	84	16	..	..
45	89	11	..	..
85	92	..	8	..
A-108	89	2	9	..
138	77	..	20	3
319	90	3	7	..
A-334	91	..	6	3
355	92½	..	2½	5
356	93	4	..	3
360	85	10	..	5
380	83	10	7	..

By FRANK G. STEINEBACH
Editor
and HOWARD C. TUTTLE
Chicago Editor
THE FOUNDRY

A REVIEW of the various society activities, a symposium on nodular graphitic gray iron, and consideration of important management problems featured the annual meeting of the Gray Iron Founders' Society held at the Edgewater Beach Hotel, Chicago, Oct. 27-28. Attendance at the meeting exceeded 225.

In the annual election of officers of the society, Hermann P. Good, foundry superintendent, Textile Machine Works, Reading, Pa., was re-elected president. H. L. Edinger, president, Barnett Foundry & Machine Co., Irvington, N. J., was chosen vice president. Robert G. Schaefer, board chairman and treasurer, Schaefer-Goodnow Foundries Inc., Pittsburgh, was re-elected secretary, and Henry J. Trenkamp, president, Ohio Foundry Co., Cleveland, was re-elected treasurer. Raymond L. Collier was re-appointed executive vice president.

Mr. Good also was re-elected to the board of directors, and the following new directors were chosen: George R. Holmes, McLagon Foundry Co., New Haven, Conn.; R. W. Foster, Bay City Foundry Co., Bay City, Mich.; E. B. Christensen, Paxton-Mitchell Co., Omaha, Nebr.; E. N. Harrison, Harrison Foundry Co., Chattanooga, Tenn., and J. Scott Parrish Jr., Richmond Foundry & Mfg. Co., Richmond, Va.

In opening the first session, Hermann P. Good, society president, told of the tremendous strides the organization has made the past few years. The 10-year plan of activities, undertaken two years ago, is well ahead of schedule. Henry J. Trenkamp, treasurer of the society, reported that the organization is in sound financial condition with approximately a quarter of a million dollars in assets. Mr. Trenkamp also reported on activities of the Budget and Finance Committee.

Raymond L. Collier, executive vice president, presented a comprehensive report on the activities of the society, including the sales promotion activities, work that is under way on the gray iron handbook, technical activities, recent changes in the terms and conditions of sales, publication of the cost manual, completion of the annual wage and rate survey, inauguration of a safety program and numerous other features. Mr. Collier stated the society has been recognized as one of the leaders in the trade association field and that numerous requests have been received from other organizations on methods of operation.

Edward C. Hoenicke, Eaton Mfg. Co., Detroit, reported on activities of the Advertising Committee. He stated that society advertising is appearing in six business publications, that exhibit space was maintained at the recent Metal Show in Cleveland, that considerable publicity on society activities is being sent out to the technical and general press, and that further use of the emblem and society slogan is being pressed.

Arthur E. Hageboeck, Frank Foundries Corp., Moline, Ill., and chairman of the Cost Committee, reported on the publication of *Cost Manual No.* 1, and stated that preparation of *Cost Manual No.* 2 is now under way. Mr. Hageboeck urged greater use of the cost manual and other cost work of the society. E. L. Roth, Motor Castings Co., West Allis, Wis., in reporting as chairman of the Statistical Committee, urged greater participation by members in the compilation and use of statistics of the gray iron industry as col-

Society officers and directors. Reading clockwise from the center foreground: Robert G. Schaefer, secretary; H. L. Edinger, vice president; E. B. Christensen, director; R. W. Foster, director; Raymond L. Collier, vice president; Hermann P. Good, president; Henry J. Trenkamp, treasurer; E. B. Sherwin, director; E. N. Harrison, director; H. D. Caylor, director

lected by the society.

E. B. Sherwin, Chicago Hardware Foundry Co., North Chicago, Ill., outlined work of the Technical Committee in connection with the development of nodular iron. The committee believes that control will be the most important factor in the production of nodular iron. The Technical Committee will continue to study the subject. Mr. Sherwin also reported on the work of the technical director, and inauguration of a gray iron round-table luncheon at the annual convention of the American Foundrymen's Society, publication of specifications on gray iron, and co-operation with the Handbook Committee in the development of the new handbook on gray iron.

Charles O. Burgess, technical director, reported in some detail on the technical activities during the past year in initiating and furthering technical developments in gray iron. He spoke of co-operation with the ASTM in specification work and participation in meetings of the AFS and ASME and any activities for improving gray iron and increasing its use. He discussed the subject of nodular iron and some problems connected with its manufacture. Mr. Burgess also described the broad activities of the society in increasing public confidence in gray iron, discussed technical papers and articles which have been prepared, and told of work done thus far in preparation of the handbook on gray cast iron.

Peter E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, O., reporting on activities of the Terms and Conditons of Sale Committee, stated that the Steel Committee of the National Association of Purchasing Agents suggested a review of the terms of sale and this has been done, with certain suggested revisions approved by the NAPA. Reprints of the terms and conditions of sale with revisions will be available for members shortly.

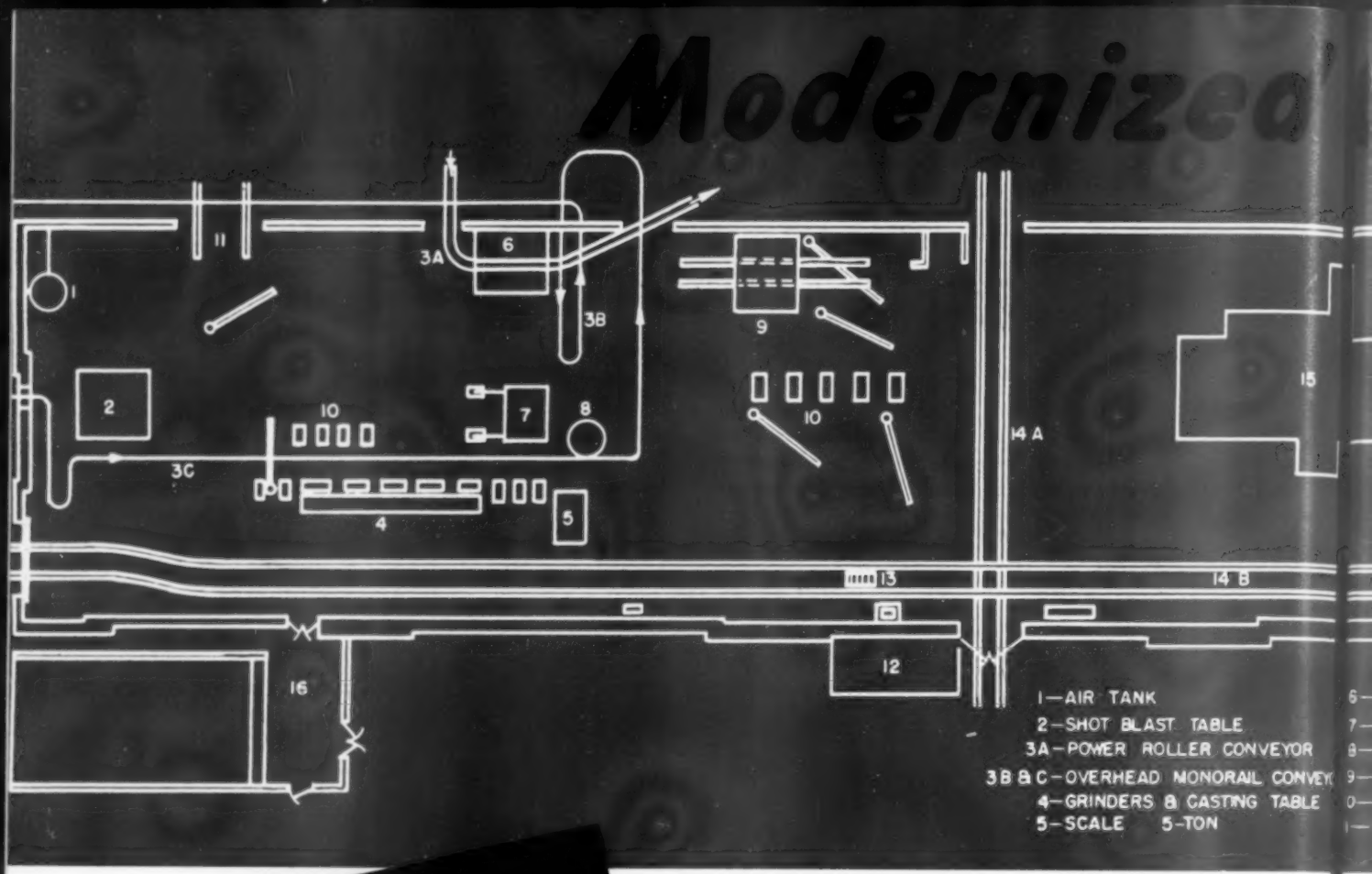
J. M. Price, Ferro Machine & Foundry Inc., Cleveland, told the society of the work and accomplishments of the Foundry Educational Foundation during the past year, and urged society members to participate in the new campaign for funds now under way. He outlined the second phase of the program which will be undertaken after the new campaign has been completed and listed (*Please turn to page* 137)

IRON FOUNDERS

Review Activities at Annual Meeting

View of one of two luncheon sessions held during the annual meeting

Modernized



By ROBERT H. HERRMANN
Associate Editor
THE FOUNDRY

Fig. 2—Bench grinders and inspection table employed for small castings

Fig. 3—Interior of blasting room, showing the three platforms and the blasting equipment

Fig. 4—Booths where hand grinding and chipping of medium size castings are performed

Fig. 5—Operator at blasting gun control panel

EXTENSIVE changes in the ferrous castings cleaning room of Fairbanks, Morse & Co., Beloit, Wis., have resulted in regrouping of the equipment so that small, lightweight castings may be cleaned at one end of the room, as shown at left in Fig. 1, and the larger, heavier work handled in the remaining area.

The cleaning room normally handles 75 to 90 tons of castings a day. Poured molds containing small castings such as electric motor frames, gears, pistons, pump bodies, and similar units cast by the company, enter the cleaning room on a power roller conveyor shown at 3A in Fig. 1. The castings are shaken out at station 6 on a vibrating shakeout, the sand

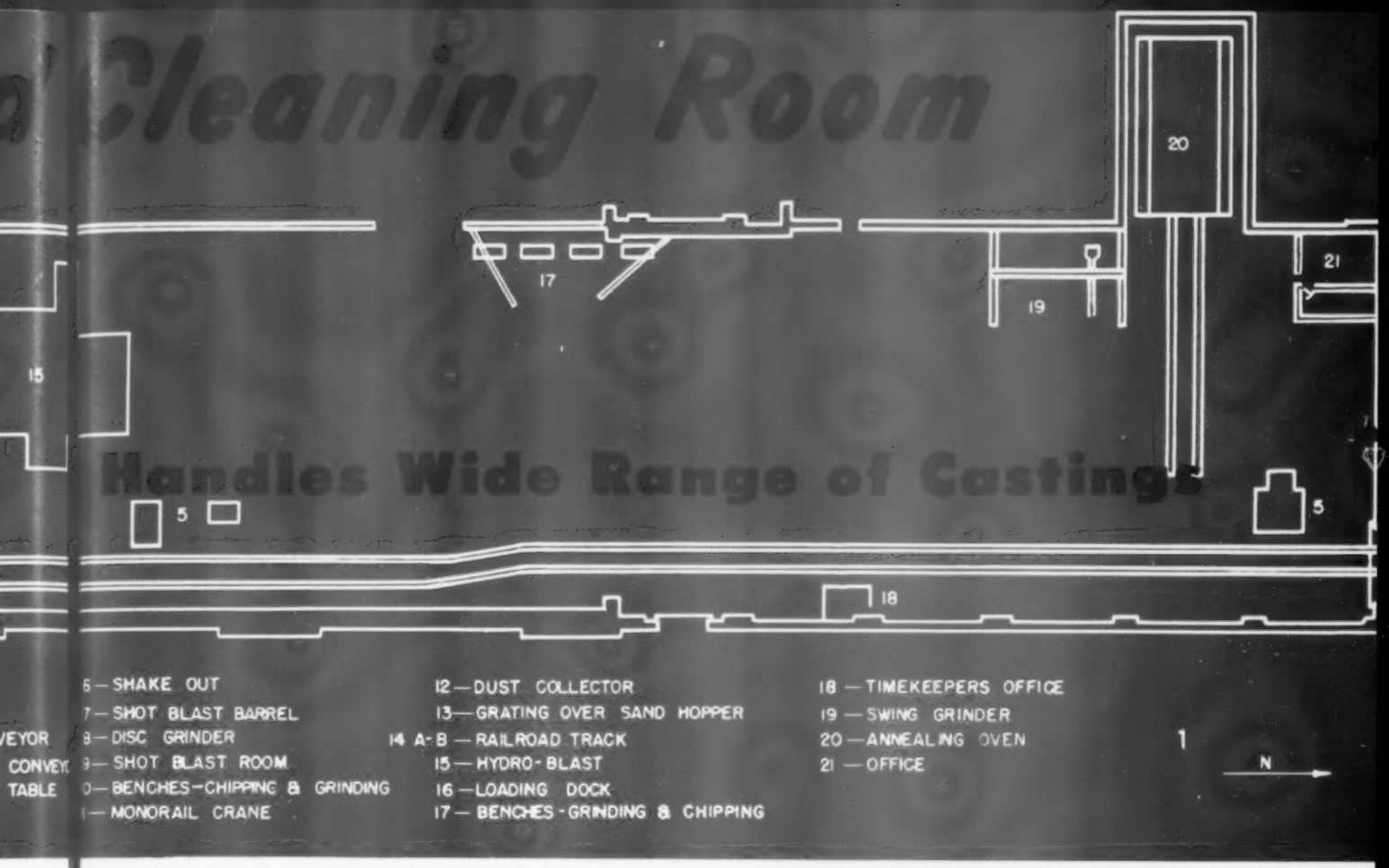


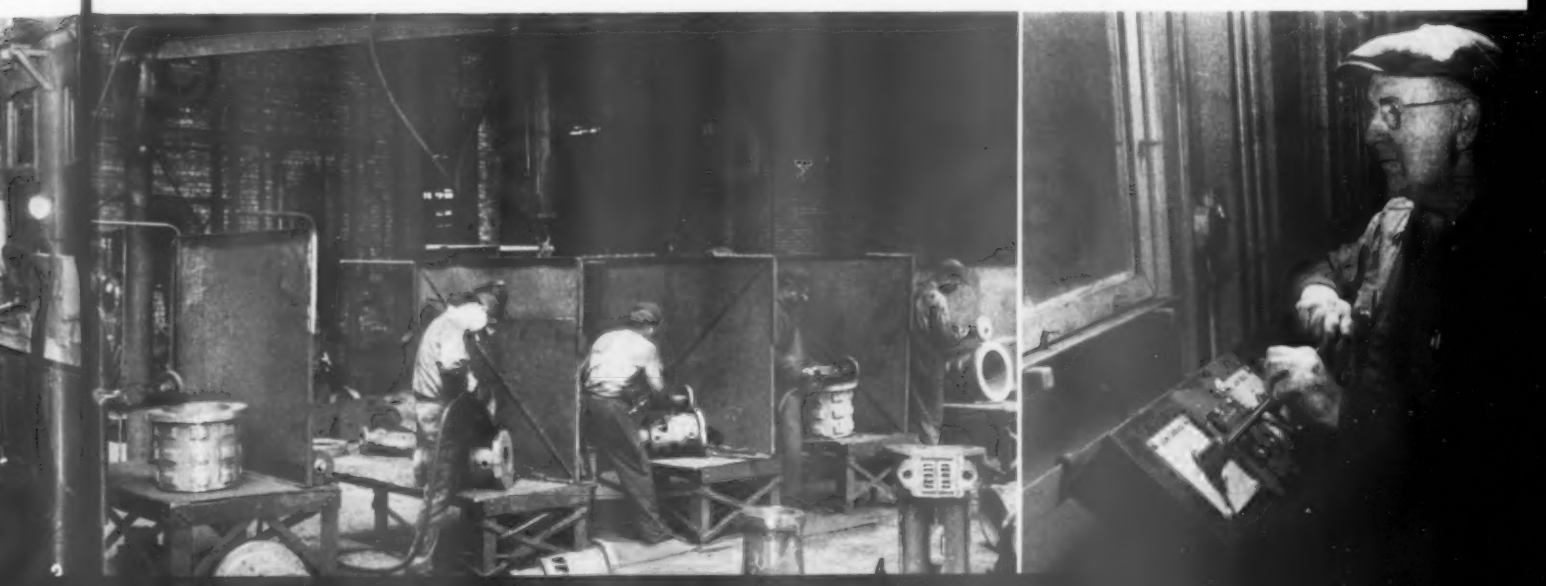
Fig. 1—Sketch showing layout of cleaning room at Beloit, Wis., foundry of Fairbanks, Morse & Co.

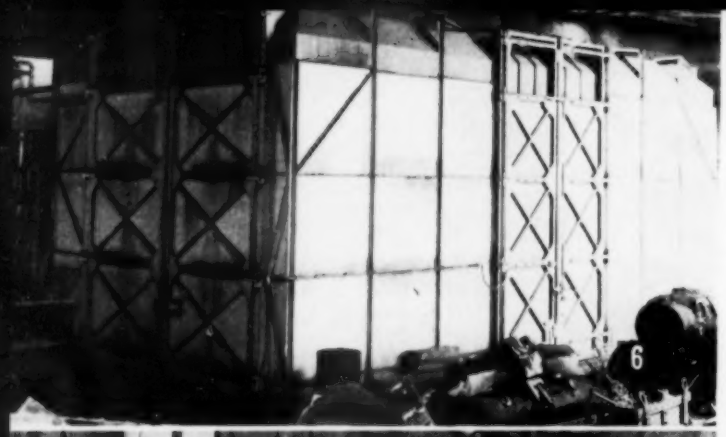
being carried away by an underground belt conveyor and the castings hung on hooks carried by the overhead monorail conveyor shown at 3B. This conveyor carries the castings upward and out of the cleaning room into the foundry where it turns southward to follow the wall of the cleaning room and bring the castings to ceiling level.

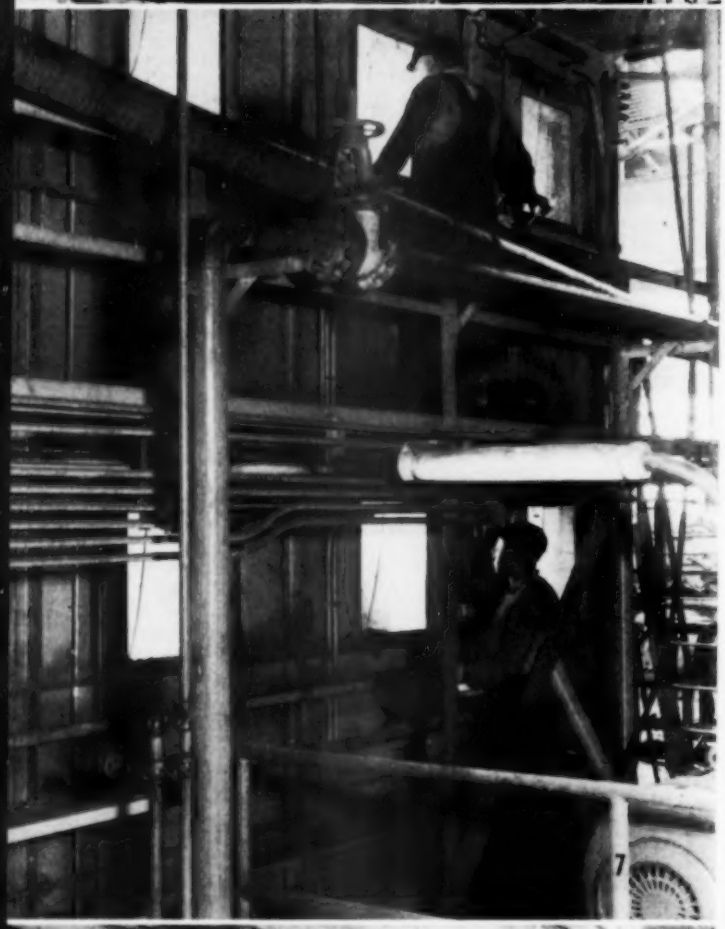
At the outside wall of the building it turns again, conveying the castings outside the foundry above the roof to a point approximately 400 ft from the cleaning room where it makes a 180-degree turn, returning outside toward the cleaning room. It then descends to point X where it turns to re-enter the cleaning room at a height convenient to the floor for unloading the castings.

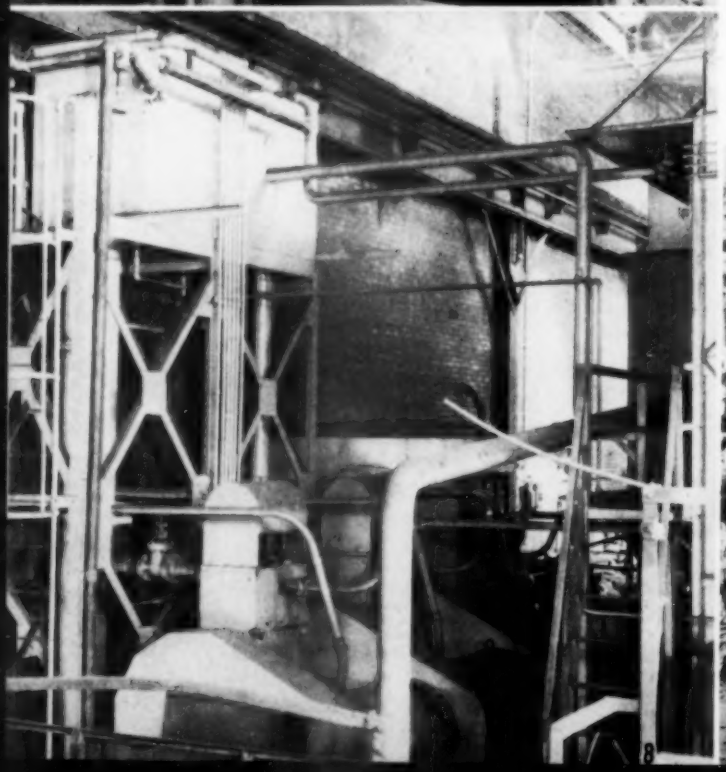
During all this travel the castings have had an opportunity to cool sufficiently so that they may be handled by the workmen. The conveyor carries the castings past a shotblast table, item 2; benches where chipping and hand grinding operations are performed, item 10; bench grinders and a casting inspection table, item 4 (shown in Fig. 2); a shotblast barrel, item 7 and a disk grinder, item 8.

As the castings are conveyed through the area, they are removed at the various stations best suited for the first cleaning operation for that particular casting. After each cleaning operation, the castings are placed in metal boxes for transportation to the next operation and for subsequent removal from the









cleaning room either to storage or the machine shops.

Operations in the remaining section of the cleaning room, where large pump bodies, large electric motor frames, diesel engine blocks and castings for railroad equipment are cleaned, center around a Hydro-Blast cleaning unit, which cleans castings by subjecting them to a high velocity stream of water and sand which is obtained by using 1800 to 2000 psi water pressure. This combination cleaning and blasting unit is said to be the largest piece of equipment of its kind in the country and possibly in the world. Castings coming into this section of the cleaning room are brought in on flat cars on a railroad track, item 14A, Fig. 1. They are unloaded by an overhead traveling crane which also is used to place the castings in the hydroblast unit, item 15.

The blast cleaning unit consists of a roofless steel room, 20 ft wide, 40 ft long and 18 ft high, with swinging doors at both ends and one side. It is shown in Fig. 6. At each end of the room are two circular turntable platforms, 12 ft in diam, on which castings to be cleaned are placed. These turntables are made in two sections, each resembling a huge circular pan with sides about 2½ ft high. The stationary lower sections rest on the floor of the wet sand blasting room and contain the (*Please turn to page* 218)

Fig. 6—General view of wet blast cleaning room

Fig. 7—Control panel operators are shown on catwalks at upper and lower levels

Fig. 8—Pumps and surge tank incorporated in the blasting water system

Fig. 9—Diesel engine cylinder castings before wet sand blasting. The same castings after blasting are shown in Fig. 11

Fig. 10—Cross-sectional view of mixing nozzle through which sand-water mixture is sprayed. Renewable tungsten-carbide liner is shown in solid white

Fig. 12—Chipping a large casting after blasting

Fig. 13—Removing a clean casting from the stationary platform in the blasting room

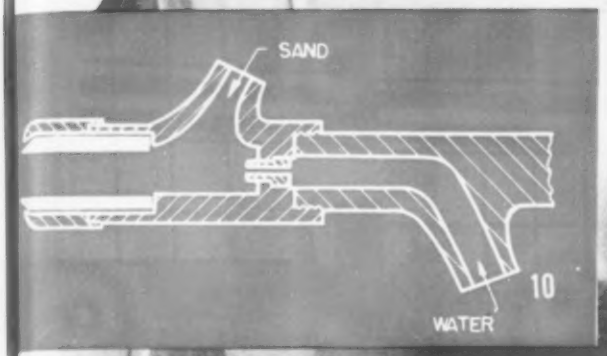


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Fig. 4—Constructional details of trajectory pouring tube and pouring basin

Fig. 5—Pouring a casting with trajectory spout. Tube is raised hydraulically

Specially designed facilities for production of centripetal or counterflow centrifugal castings for steam turbine and jet engine use are described in this second and concluding article. The project discussed is a special research program conducted for the Navy

By H. H. HARRIS
Project Director
U. S. Navy Research & Development Project
and ERLE F. ROSS
Chicago Editor
THE FOUNDRY

U.S. NAVY Casting Research

THIS research program has been directed toward improvement of the centrifugal casting process and an original modification thereof designated as counterflow centrifugal or centripetal casting. At this point, therefore, it is essential that the reader understand the fundamentals of the two methods and the respects in which they differ.

Centripetal force is that force which tends to impel a body moving or revolving around a center to move toward that center. By this method of casting, the metal proceeds or is directed toward the center at a uniform and controlled rate with the mold filling inwardly from the periphery. In a simple wheel form the vertical down gate passes through the center of the hub to a point several inches below the hub. The metal then travels horizontally outward through spoke gates to a continuous or interrupted "ring" runner gate. This runner gate is several inches below the outer edge of the mold cavity and of approximately the same diameter. Small pencil gates extend vertically from this runner gate to the outer edge of the mold cavity.

As the mold rotates, metal is distributed centrifugally from the down gate through the spoke gates to the ring gate and thence upward to the outer edge of the mold. Thus, the metal that enters the mold is traveling with the mold at the same speed and is not thrown into the mold. It does not splatter shot and chase around the mold cavity, contacting maximum mold surface and presenting maximum surface to oxidation as is the case with centrifugal casting. The metal proceeds centripetally toward the center. All cavities are completely filled from the head to the surface of the progressing metal; all but the leading edge of entering metal feeds from the gates into metal.

Any gating which radiates from a center downgate functions as a closed impeller pump with the fluid greatly accelerating in speed as it progresses toward the rim. As metal travels away from the center, increasing acceleration tapers the metal into diminishing cross section, leaving the radial gates only partially filled and causing them to inspirate air through the parting and function as a Venturi at point of mold entry. Choking to correct this makes a nozzle of the ingate to erode and splatter. Thus, there is much more erosion, air, and steam induction shotting and splatter in centrifugal casting than in conventional static casting.

Gating for Centrifugal Casting—In centrifugal casting it is not necessary to use a center downgate to the bottom of the mold. The metal can be fed at an angle, by-passing the mold cavity where necessary to an upper or lower stabilizing ring gate. Metal can be fed to any point where it will proceed in an advancing and continuous ring, or column of metal from the outer portion of the mold cavity toward the center. It can also be introduced when need arises at a point inward from the outer mold cavity. In the latter case, depending upon cavity form and distance and speed of metal movement, most of the advantages can be retained. Metal also can be fed by a stationary or rotating ceramic spout, or spouts, to a collector ring gate without a center gate.

Centripetal castings are commonly rotated at relatively slow speeds, and a ferrostatic balance is maintained by adjusting the height and diameter of the downgate so that with sand gating the entire gating system may be kept full at all times with substantially no inspiration of air. Even if air should be inspirated, it is separated out in the ring gating structure which has substantially the same ferrostatic pressure as the highest pressure in the mold cavity. In case of sand castings, the principal erosion takes place in the horizontal gating and dirt, steam, and gases are centrifuged out and trapped in the outer

Casting Research

gating. The vertical ingates are so located as to feed metal from the clean metal at the center portion of the ring gate to the ingate. If these vertical gates—pencil or otherwise—in sand or erodable material should produce dirt for any reason this dirt can be trapped easily and effectively by small crap-traps on the inner edge of the vertical ingate just prior to mold entry.

Pencil gates are not essential. Spoke or angled gates from the center downgate can feed directly to the casting and still maintain a continuous column of metal until the cavity is filled. This system, while inferior in relative cleanliness (any eroded mold material is expected to pass through the casting instead of being trapped in the gating system) produces cleaner castings with better machining qualities than static or centrifugal casting.

A distinct advantage of placing the horizontal or intermediate runner gate some distance below the casting, or above when necessary, is that it permits the use of ingate forms which can bend in shrinkage so that no detrimental stress is set up between the

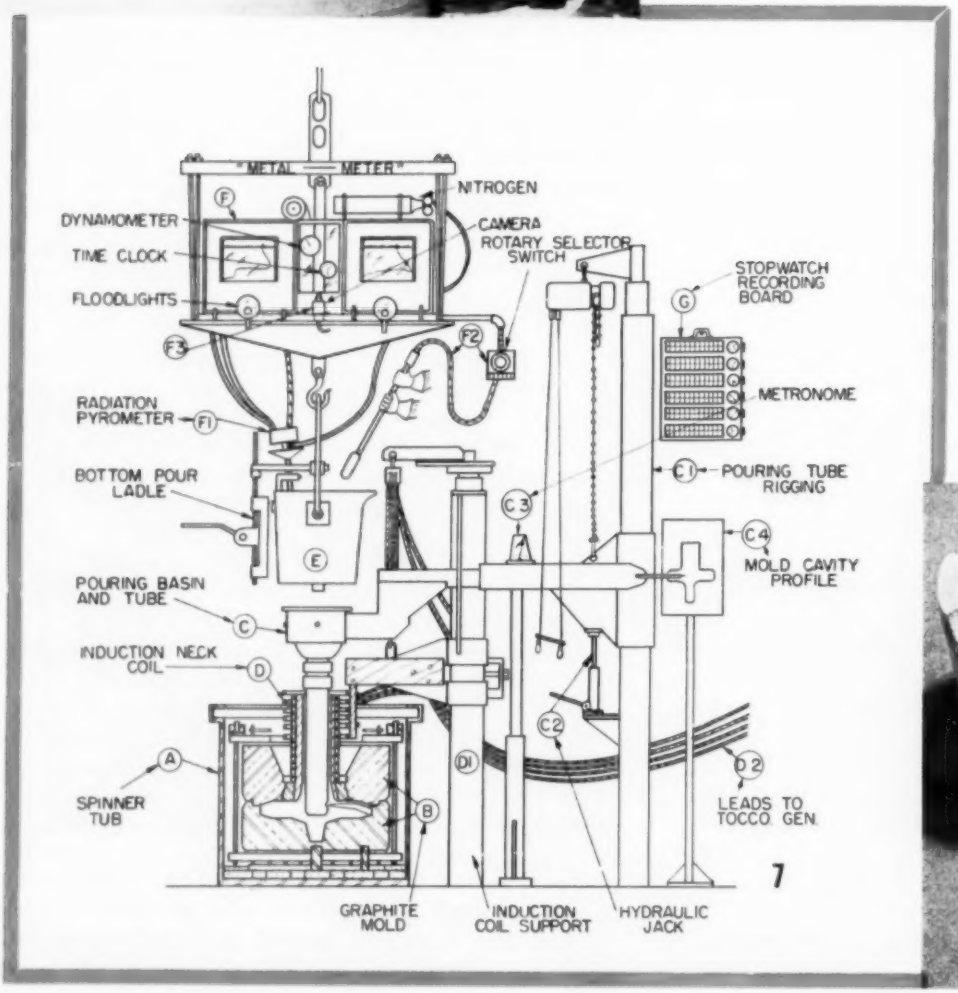


Fig. 6—Solidification is checked by plunging a series of probes into the head

Fig. 7—Sketch showing details of master casting machine and its auxiliary equipment

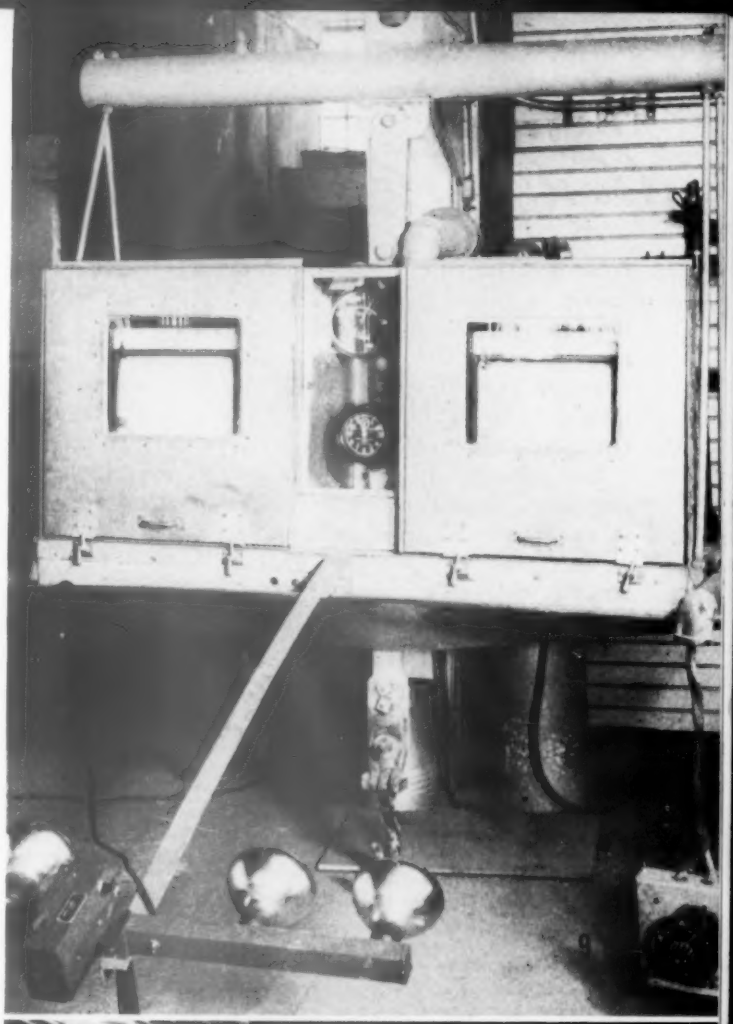
Fig. 8—Pouring cup fractured to show metal slug remaining as residue and orifice size maintained after 340 pounds of metal have passed through

gate and the casting. Such stresses, with resultant strains and deformations, are common in conventional static and centrifugal casting practice.

In wheel and ring forms there is a great advantage in feeding the rim of the casting and letting the metal solidify from the center out. This puts the cooler metal with the finer structure in the center of the wheel where the greatest stress develops in use of the casting as a high-speed rotor. It also permits the outer periphery or rim of the wheel to solidify last and shrink upon the already solidified metal, placing the center in compression and the ring in tension. This roughly simulates the practice of shrinking a tire on a wheel or a tube on a gun breech. This should add to strength, permitting higher speeds, higher safety factor or lighter wheels for high-speed rotation. The compressive forces exerted on the hub and web sections by delayed shrinkage of the rim section are opposed to the tensional force of rotation. While the unit centrifugal force is higher at the rim, the load concentrates in maximum tension at the hub.

Centripetal casting rotation is employed: To equally, uniformly and controllably divide and distribute metal; to trap and remove dirt through changes in form of gating cavities and orifices which it permits; through utilization of sufficient pressures to prevent infiltration of air into the gating and mold cavities as the metal advances; to permit centrifugal separation of eroded mold materials, the gaseous and solid by-products of the combustion of organic mold binders and entrapped air, steam or gas from the fluid metal.

Centrifugal or centripetal casting has no effect on the density or weight per cubic inch of the metal. In centripetal casting, because the metal is fluid



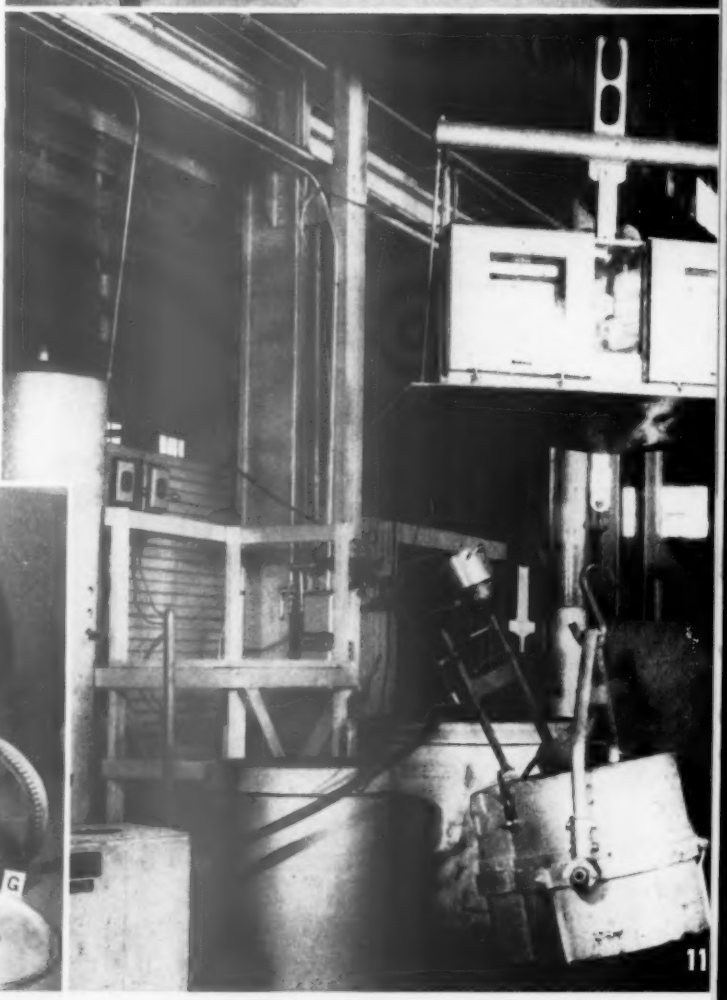
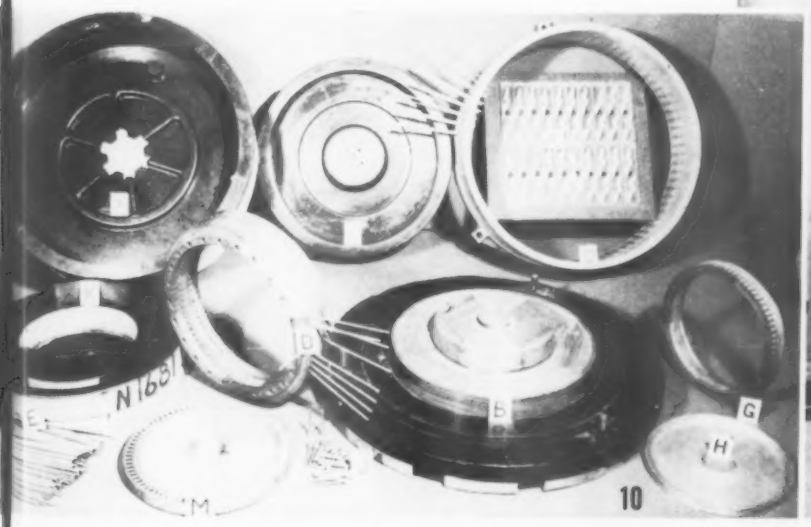


Fig. 9—Close-up view of metal meter which records temperature of metal in ladle, weight of metal poured and pouring rate

Fig. 10—Assembly of corebox patterns for casting 79-blade shrouded steam turbine rotor. Explanation of key given in text

Fig. 11—Target tube of radiation pyrometer is immersed in ladle and connected through Rayotube to metal meter recorder



Casting Research

from the rim to the center, the downgate can be adjusted to obtain ferrostatic balance with or without heads or risers, and substantial pressure as desired can be maintained at the hub. This corrects the negative pressure where radial gates leave a downgate in conventional centrifugal casting and eliminates the need for massive gates so frequently employed.

Use of centripetal force to greater extent than is necessary, is detrimental because it multiplies erosion in proportion to pressure, flow and impact and separates fluid metal into shot or globules by injection, impact and turbulence. Arguments for conventional centrifugal castings are in part sound where a rim of relatively compact (*Please turn to page* 116)

Fig. 12—Gas turbine rotor is cast centrifugally in graphite mold. Head is heated by induction

Fig. 13—Method of pouring gas turbine rotor through trajectory spout which is raised during pouring

Fig. 14—Corebox for steam turbine rotor made for preliminary study of gating, metal flow and shrinkage

Fig. 15—Ring core made in corebox shown in Fig. 14. Cores first were sand, later ceramics

Fig. 16—Centripetally cast 79-blade steam turbine rotor as it leaves the mold

Fig. 17—Rough machined one-piece turbine rotor

Fig. 18—Removing rotor casting from graphite mold

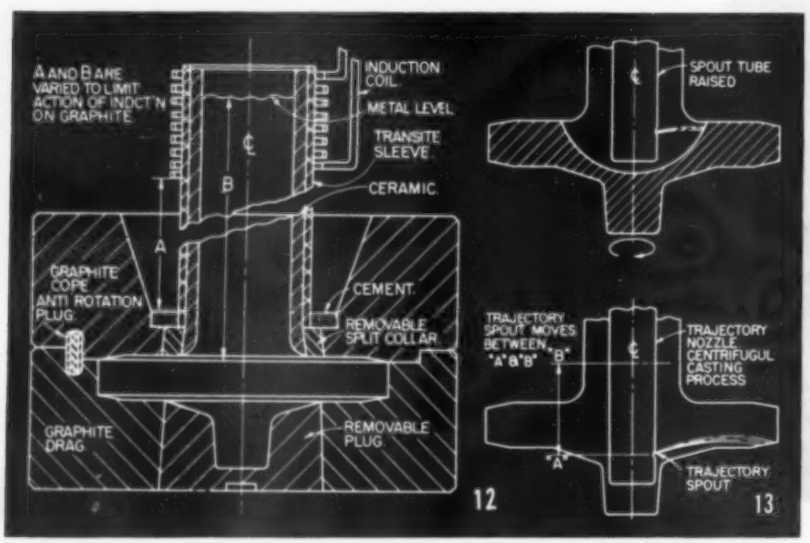
Fig. 19—Showing cope of graphite mold for gas turbine rotor with ceramic pouring tube in place

Fig. 20—Removing ceramic sleeve from head of rotor casting. Cope graphite collar still is on head

Fig. 21—Rough gas turbine rotor casting. Induction heating requires a tall head

Fig. 22—Illustrating uniform fine grain structure obtained in gas turbine rotor casting

Fig. 23—Slab cut through center of gas turbine rotor disk showing extremely good structure



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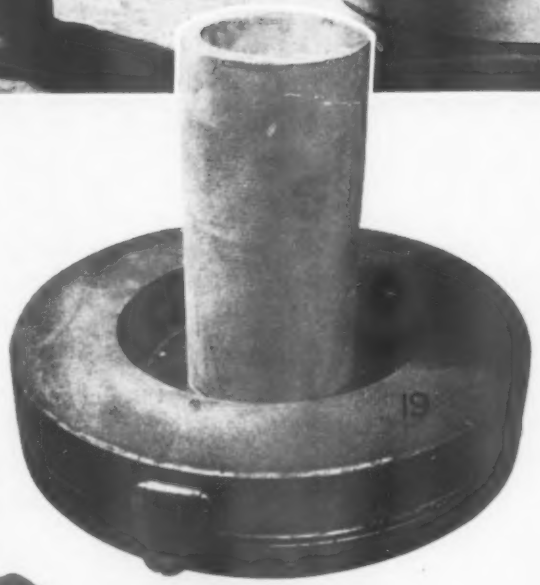

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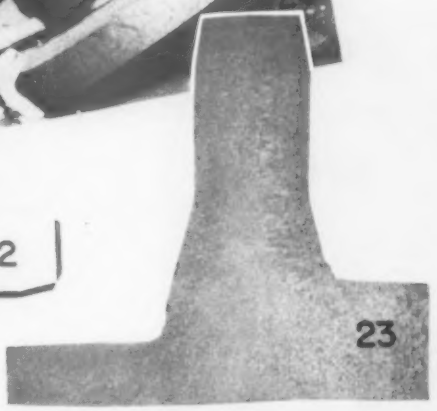

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By WILLIAM G. GUDE
Managing Editor
THE FOUNDRY

Non-Ferrous Founders' Society

Holds Annual Meeting

ANNUAL meeting of the Non-Ferrous Founders' Society was held at the Netherland Plaza Hotel, Cincinnati, Oct. 14. The day's sessions, devoted to discussion of the society's activities and industry problems, were concluded with a reception and the annual dinner.

The society's president, Fred Haack Jr., Capital Brass & Aluminum Foundry Co., Chicago, presided at the opening meeting devoted to reports of officers and committtees. In discussing the past year's activities, James W. Wolfe, secretary-treasurer, indicated that the organization is in a sound financial condition with a well maintained membership. He also cited instances of increased recognition of the industry on the part of government agencies, and touched on the advantages accruing to members through cost clinics conducted by various chapters.

Report of the Ballot Committee nominated the following new directors who subsequently were elected: For three-year terms, Henry J. Hodes, Prior Brass Mfg. Co., Kansas City, Mo.; Watson B. Wilkins, American Manganese Bronze Co., Philadelphia; Harry F. Sweitzer, I. S. Spencer's Sons Inc., Guilford, Conn.; Arthur Fischer, Fischer Casting Co., Plainfield, N. J.; C. E. Piper, Erie Bronze Co., Erie, Pa. For one-year terms, William L. Leopold, Northern Bronze Corp., Philadelphia; William E. Paulson, Thomas Paulson & Son Inc., Brooklyn, N. Y.

At a later meeting of the board of directors, the following were named to the society's executive committee: Fred Haack Jr.; J. D. Zaiser, Ampco Metal Inc., Milwaukee; Walter M. Clark, D. W. Clark & Co., South Boston, Mass.; L. H. Durdin, Dixie Bronze Co. Inc., Birmingham; William A. Gluntz, Gluntz Brass & Aluminum Foundry Co., Cleveland; Watson B. Wilkins, and E. W. Horlebein, Gibson & Kirk Co., Baltimore. The executive committee then elected the following new officers for the coming year: President, Walter M. Clark; vice president, J. D. Zaiser, and second vice president, L. H. Durdin.

Growth in number and activities of the society's chapters was reported by Walter M. Clark. Newest of the chapters is the recently organized group at Providence, R. I. Reporting for the Cost Committee, William A. Gluntz announced that it is proceeding with further simplification of its costing procedure, so that adequate information will be made available to even the smallest foundries. Special articles on cost subjects, to be distributed to society members in coming months, will include the following topics: Fixed overhead, metal shrinkage losses, evils of flat pricing of match- (*Please turn to page* 127)

J. D. ZAISER
Vice President

WALTER M. CLARK
President

L. H. DURDIN
Second Vice President

By HIRAM BROWN
Chief Metallurgist
Solar Aircraft Co.
Des Moines, Iowa

Modern Practice in Investment Casting

Preparation of investments, readying the mold, gating practice, and melting and pouring are among the subjects discussed in this second of three articles treating the factors involved in successful production of investment castings

IN ANY investment it is important to control particle size. Finer powders are too dry using the same water content as coarser ones, because of the increased surface area which must be wet to obtain the same degree of workability. Particle size can be controlled by elutriation and hydrometer checks. The values are expressed as median particle size, which is determined by hydrometer measurement during sedimentation of water suspension. The Casagrande hydrometer method[6] is used since the finest screen made retains only those particles larger than 37 microns (.001443-inch).

Moisture control is also important since increasing moisture decreases strength, and increases shrinkage, drying time, and cost. A Braebender moisture tester is excellent for this purpose.

In mixing add dry material to liquid. This minimizes sticking to sides of container. Usually about a two-minute mixing cycle is sufficient. Vibration and vacuum together are used effectively.

After investment is mixed it is usually necessary to vacuum it to remove bubbles of air (usually used on nonferrous investments). A vacuum of 29 to 29.4 inches is necessary to complete removal of bubbles. After being held three minutes under vacuum it is vibrated on a vibratory table. When pouring the ceramic around the patterns the flask is vibrated. The mix should be poured down the side of the flask but not directly on the patterns. The flask may be rotated during this operation to assist in removing bubbles. The flask is filled to a point just covering patterns, and after vacuuming is then completely filled and allowed to stand for one or two minutes on vibrator. After about an hour it is hard and the base can be removed. Do not vibrate too long or some settling action will occur in the flask. This gives areas of varying strength and subsequently more subject to cracking. Also, sufficient vacuum should be obtained and held to pull the air out of the mixture and to free any trapped air bubbles in recessed portions of the pattern.

Where investment mixes are too viscous to vacuum (as in the case with most high temperature ceramic mixes), the mix is simply placed around the precoated patterns and vibrated for about an hour. The precoats are usually so fluid that they do not tend to trap bubbles, and it is not necessary to vacuum before dipping the patterns into it.

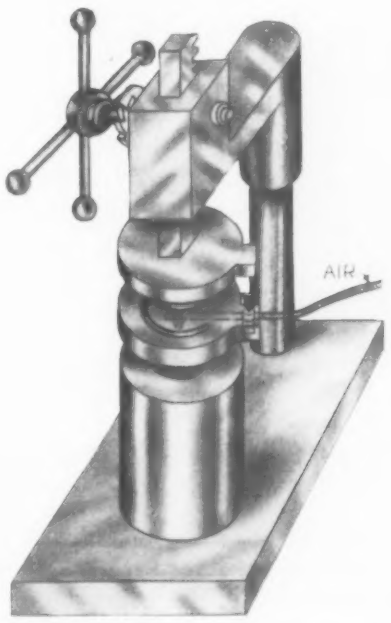


Fig. 5—Pressure casting machine

Ferrous Investments — It appeared that much of the scrap encountered in this process was due to the necessity of precoating before investment. It was believed that if a single investment could be developed which would withstand heat and give good surface finish without necessity of precoat, then the process might be improved considerably. For that reason an investigation was started with the twofold purpose of, (1) determining whether precoat was contributing to defects, and (2) if it was, could a single coat investment be perfected which would be satisfactory.

It was found that pits occurred in a large percentage of castings. The pits were sharp in outline, usually of a rectangular or crude trapezoidal appearance. It was found that the pits were caused by the precoat peeling or flaking away from the investment during burnout, probably accentuated by their difference in coefficient of expansion. The flakes of dip coat drop into the flask (*Please turn to page* 241)

Fig. 1—Applying a refractory wash to the inner surface of a large metal mold for making centrifugal ring castings of type shown in background

Fig. 2—Close-up view of induction furnace delivering metal to a pouring ladle. Tilting is done by a self-contained hoist arrangement at rear

Fig. 3—Pouring a mold that is being rotated about a horizontal axis (back of guard) so that metal is fed centrifugally toward mold walls

By HERBERT CHASE

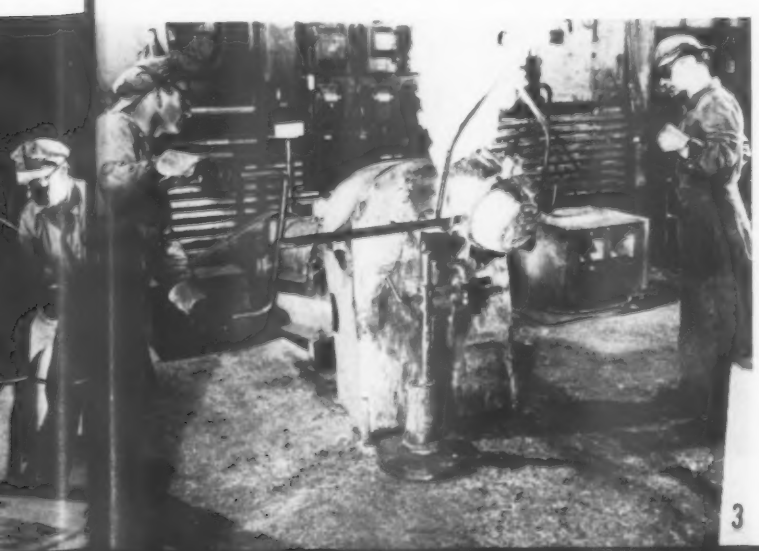
Centrifugal Casting

OF NONFERROUS ALLOYS

MOLTEN metal for centrifugal casting of both ferrous and nonferrous alloys at Allis-Chalmers Mfg. Co., Milwaukee, is provided by recently installed induction furnaces of the type shown in Fig. 2. Two furnaces of this size are available, although one, employing a larger coil, has double the 350-lb capacity of the other unit. Both furnaces are served by a 300-kw mercury arc converter such as shown in Fig. 4. While the equipment can accommodate the melting of ferrous metals, the major portion of the castings made centrifugally in this foundry are nonferrous alloys.

The furnaces offer the advantages of rapid heating, low oxidation losses, close control over metal temperature, stirring of the bath, and comfortable working conditions. They also are well adapted to the relatively small batches required of the many different nonferrous alloys melted. About 30 minutes is required to melt a 300-lb charge of bronze and about 1 hour for a 700-lb charge of steel.

Most of the centrifugal casting work is done with machines of the type shown in cross-sectional view in Fig. 5. It is designed for operation at various angles from vertical to horizontal, the angle being adjusted by a hand crank. Some larger centrifugal castings are produced on a rotating table having a fixed vertical axis. This machine is used only for molds too large for the variable angle machines. The latter were developed originally by Allis-Chalmers for this foundry. Drive is by v-belt to a horizontal shaft from a motor arranged to vary the speed of the table shaft from a low speed of 200 to a high speed of 3000 rpm.



3

In general, this 90-degree casting machine, as it is termed, is used for castings symmetrical about the pouring hole at the center. From this hole the metal flows radially by centrifugal force toward outer walls of the mold. In some cases, the metal flows through radial gates to fill individual cavities but, for tubular castings, which predominate in this foundry, the metal is distributed around the bore to form the walls of tubes ¼ to 4 in. thick.

In such tubular castings, the walls are of uniform thickness only if the mold axis is horizontal. At any other angle, the inner wall, though of parabolic shape, becomes nearly cylindrical if a high enough speed of rotation is used. This wall includes, at the innermost layer, such dross as may enter with the metal. The inner layer is machined away. Change in angle of the axis of rotation affects to some extent the contour of the inner wall and the dross distribution. The major objective is to facilitate introduction of the molten metal. Usually 3/16-in. allowance for machining is sufficient.

Centrifugal castings having a central hole need not be true tubes of uniform wall thickness and may have flanges, either circular or polygonal, or walls of tapering thickness. Centrifugal action tends to force air and impurities inward and this results in denser castings generally free of porosity.

If a radial gate or gates are used, they are last to fill and generally contain whatever dross is in the metal, the dross being cut off, of course, with the gate. Design must be such that any air that might form pockets or pores can escape, if sound castings are expected. As a rule, however, the yield of sound castings is higher than for gravity castings and, in some cases castings having thick walls that must be fed by metal flowing through thinner walls can be produced successfully.

Molds for centrifugal casting must be fastened securely to the rotating flange or table with the pouring hole axis in the axis of rotation. It is necessary to balance the load about the axis and, if the mold is not symmetrical about the axis of rotation suitable counterweights must be provided. For new molds for castings that have a central hole in the axis of rotation, it may be necessary to try different angles until that giving optimum metal distribution is found.

Speed of rotation depends in part upon the type of mold and how it is supported by the flask as well as upon the type of metal being cast and the physical properties desired. Often, the flask is a steel tube, but square or other shapes can be used.

For thin wall tubular castings, a pressure of 100 G (one hundred times gravity) is commonly applied. Other castings are made, as a rule at 40 to 60 G ($G = rpm^2 \times$ casting diam $\div$ 70,500). While a high pressure is favorable to the production of dense castings, lower pressures are often adequate and in no case are they higher than is safe for the type and size of mold employed.

Except for large molds placed on the rotating table in a pit, a steel guard surrounds the mold. The guard commonly used has a removable flat steel cover held in place by levers actuated by flyballs that press the cover firmly in place. Pouring is done through the central hole in the cover and generally through a cast metal funnel which, if the axis of rotation is horizontal or considerably tilted, has an elbow spout that delivers the metal well inside the mold. A movable shield, such as that in Fig. 3, showing a pouring operation, is often used.

Molds are of four general types: Green sand, dry sand or core, graphite, and metal. Green sand is employed mostly for large or irregularly shaped castings not readily adaptable to molds of other types because of quantity or other considerations. Dry sand or core molds are well adapted to producing small castings required in quantities sufficient to warrant multiple corebox setups or stack molds. A group of such molds is shown in Fig. 7 being assembled for casting on the rotary table of a casting machine. After stacking, these molds are attached to the table by a flanged tube, which they fit, and in which they commonly are set four high.

Each pair of stacked sections (cope and drag) has a set of cavities spaced between tapered bosses that fit mating holes and insure correct registry. All cavities have axes placed radially around the central sprue from which filling takes place through radial gates. Spacing is symmetrical, hence balance is good as long as the axis of the central sprue is made the axis of rotation.

Graphite molds are machined from graphite bar stock, 6, 10 or 15 in. in diameter, such as is produced for large electrodes. These molds are called semipermanent as they can be used, as a rule, for making 50 to 5000 castings before ejection of the casting becomes so difficult as to impede production seriously.

Walls of the castings made in graphite molds can be tapered if desired and generally are given some draft to facilitate withdrawal from the mold. If the casting is only a few inches long and is produced in a thick-walled mold, little or no draft is necessary, as the casting shrinks more than the mold in cooling and frees itself for removal.

Graphite molds up to 24 in. in diameter and 72 in. long are used for producing bearing sleeves or bushings but the approximate minimum hole size is about 1 in. Outside of the mold is machined to fit a steel tube or flask which, of course, supports the graphite walls. When cavity walls wear, they can be machined smooth, say for the next larger size of bushing to be cast, but the minimum feasible thickness of graphite walls is about 1 in. Machining is accomplished easily with carbon steel cutter bits and a woodworking lathe. Molds not unduly worn are held in stock for reuse as needed.

Heat from castings made in graphite molds dissipates through the steel flask to the air rapidly as rotation continues until solidification. Some flasks are finned to promote radiation. The casting commonly

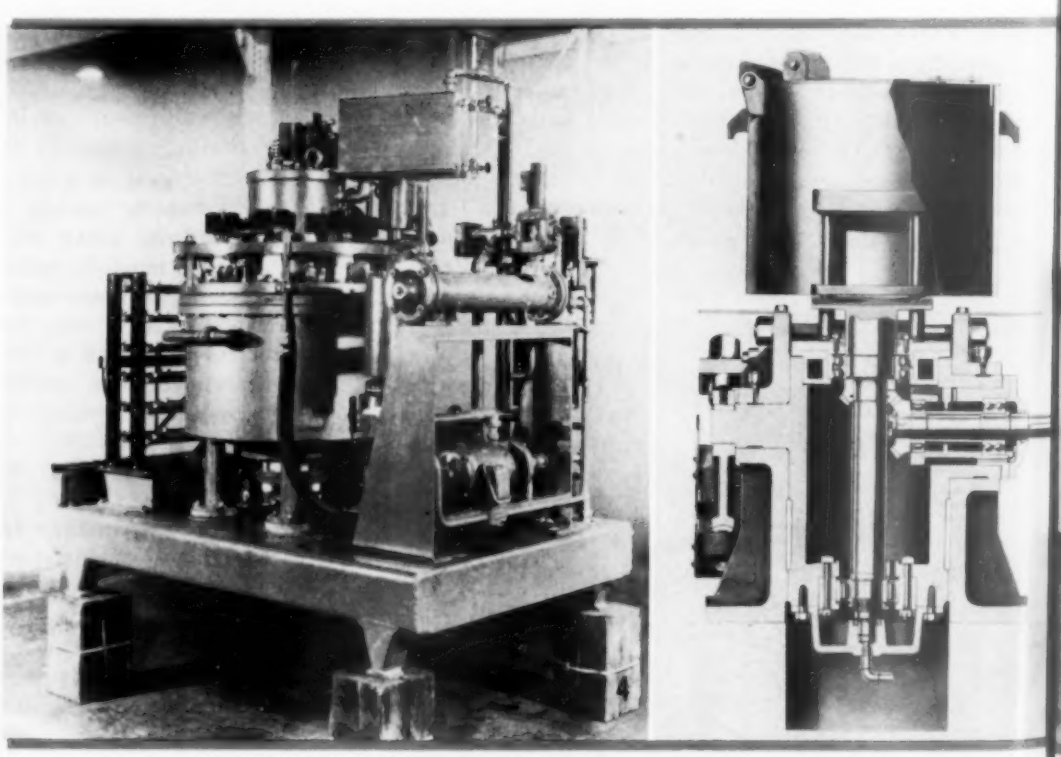


Fig. 4—Mercury arc converter (with heat exchanger unit) used to supply 1000-cycle current to induction melting furnaces

Fig. 5 — Sectional view of centrifugal machine through the axis of the drive shaft (in trunnion) and the tiltable shaft that rotates the mold inside the guard at the top

is removed with expanding tongs while still at red heat, after stopping mold rotation. Graphite molds are light and easy to handle, have good dimensional stability, provide a good casting surface and are not subject to heat checking.

Excellent centrifugal castings are produced in permanent metal molds. Useful life of the mold depends in part not only upon the mold metal but also upon the metal cast in the mold. Life decreases as alloys of higher melting point are cast. Although split metal molds can be made, they are expensive and require extra handling and clamping means.

In general, simple one-piece metal molds having ample draft are preferred and their cost is warranted only when net cost per casting, including amortization of the mold is less than for other types of molds. Metal molds of circular form, the machining of which is simple, are practical and may be essential, especially where size is greater than can be made from carbon rods generally available. A case in point is the mold, Fig. 1, used for casting a bronze wear ring for a centrifugal pump.

Most of the 28 alloys cast in this foundry are copper base and include many common types. Among these are tin bronzes, gun metal, pure copper, aluminum and manganese bronzes, leaded copper-nickel alloys, tellurium-copper, etc. Silver with 10 per cent copper has also been cast as have many other nonferrous alloys. The centrifugal casting department was set up primarily to handle nonferrous metals but the addition of induction furnaces made it possible to cast ferrous alloys occasionally. Demand for ferrous castings are commonly made more advantageously in sand or in precision casting foundries that the company operates.

When phosphorus is used to deoxidize tin bronzes, there is some tendency for (*Please turn to page* 127)

Fig. 6 — Typical nonferrous centrifugal castings include sleeves and bushings in rear row and, in front row, two naval brass nuts, two copper switch gear parts and a flanged bronze sleeve

Fig. 7—Assembling a dry sand stack mold on the horizontal table of a centrifugal machine. Each pair of mold sections (cope and drag) makes four castings

National Foundry Association

HOLDS 51st ANNUAL MEETING

By B. K. PRICE
and L. E. BROWNE
New York Editors
THE FOUNDRY

Left—A few of the participants in the NFA annual meeting. Foundry executives from 36 states were present

Below — Luncheon session held the first day of the meeting

FOUNDRY management problems, particularly in their broader relation to government and labor, came in for thorough consideration at the 51st annual meeting of the National Foundry Association held Nov. 10-11 at the Waldorf-Astoria, New York.

At the meeting, attended by foundry executives from 36 states, attention was focused on the need for combating socialistic trends primarily through establishment of a sound fiscal policy and a proper balance, legislative-wise, in management and labor relationships. To effectively achieve this end, management must not only make itself heard more clearly in Washington, but it must drive home to its employees and communities the virtues of free enterprise and the fallacies of government paternalism.

Franklin Farrel III, Farrel-Birmingham Co. Inc., Ansonia, Conn., retiring president of NFA, told members that six group leaders were added to the association staff last year to co-ordinate regional activities. This year the number will be increased to at least 12 to meet the association's expanding program. I. Richards Wagner, Electric Steel Castings Co., Indianapolis, and committee chairman, outlined recommended changes to the constitution and by-laws.

Harry E. Ladwig, Allis-Chalmers Mfg. Co., Milwaukee, was elected president to succeed Mr. Farrel, and A. V. Martens, Pekin Foundry & Mfg. Co., Pekin, Ill., was chosen vice president to succeed Mr. Ladwig. L. E. Roark, NFA, Chicago, was reelected executive vice president and J. P. Ahern and E. E. Fries, also of the NFA staff, Chicago, were named executive director and secretary, respectively. E. B. Sherwin, Chicago Hardware Foundry Co., North Chicago, Ill., was elected treasurer. Previously, Mr. Roark served as secretary and treasurer, in addition to his duties as executive vice president.

A strong plea for inspirational leadership in industry was voiced by Mr. Roark. He told management that "just meaning to do right and mildly practicing the virtues of good business are not sufficient.

"You must tell the story of American business," he said, "in a dynamic and articulate manner so that it will inspire those whom you need to follow you. The foundry industry must have effective national expression so that the industry may not be affected with adverse public opinion in addition to the usual economic trials and tribulations."

He urged foundry managers to review more carefully their contractual obligations with labor, to develop a clearer conception of their own rights and not to be led too readily into acceptance of broad overall patterns for settling disputes—"the easy way out." He said that labor contracts generally "must be revised and drawn in a manner that will permit management to function as the responsible custodian of industrial operations."

The speaker said NFA is setting up regions, each of which will have legal counsel to which all members in those regions may turn for guidance in matters pertaining to management responsibility, such as labor, taxation, general business practice and local, state and federal regulations.

Mr. Roark advised foundry executives to set up a "department of encouragement" in their organizations, so as to encourage subordinate executives in leadership; to encourage "full understanding on the part of your employees of the important part they play in our economic structure, because it cannot be separated from their own personal welfare;" and to encourage "the community in which you operate to understand your problems and help you do something about them."

As an instance of originality, he cited action by a Midwestern foundry owner, employing 400 men. To know what his employees were thinking about with regard to current affairs (*Please turn to page* 120)

Questions AND

Magnet Needle Not Attracted

Q.—We are making some caps weighing from 6 to 9 lb which are made from all scrap iron with additions of ferromanganese and ferrosilicon in the ladle. These castings must respond to the dip needle indicating that they possess magnetic attraction. However, some of the castings respond fairly well, but others do not respond at all. Can you suggest something which we can put into the iron to make the dip needle respond to its presence?

A.—It seems rather odd to us that with ordinary plain gray irons, there should be a lack of response in the magnetic dip needle, and a question arises on whether the dip needle is in good working order or not. We suggest that you examine it carefully to see that the bearings are clean and not too tight, and also that the needle has not lost its magnetism. The only type of iron which is nonmagnetic is the austenitic containing around 15 per cent nickel or managanese, and it hardly seems possible that you would be in that range of composition.

Elements in plain gray iron which affect its magnetic characteristics include silicon and manganese which reduce magnetic induction. Other elements which reduce that property are chromium and aluminum. However, their effect in the ranges usually found would be one of degree rather than a radical change. Carbon in the form of coarse flakes also reduces magnetic induction as does the presence of free carbides.

Partridge pointed out that the highest magnetic induction and permeability are obtained with cast iron that has been annealed. Hence, you might try heating the castings up to 1650° F, and cool slowly in the furnace.

Sand Not Suitable for Molds

Q.—Under separate cover we are mailing a sample of the sand used for making a cylinder block weighing about 90 lb and with an outside jacket 3/16-in. thick. The castings show scabs and veining on the surface. Sand tests show a permeability 90 to 100, moisture content 6.5 per cent, rammed to a mold hardness of 60. We shall appreciate your opinion on the suitability or nonsuitability of the sand.

A.—We are not equipped to carry on sand tests in this office, therefore we cannot submit a report on the various features, grain size, permeability, moisture content, bond, green and dry compression, and chemical composition. Basing an opinion merely on rather extended practical experience we have no hesitation in stating that the sand is not suitable. This opinion is supported by the old-fashioned, but still fairly reliable hand test, where a quantity of moistened sand is squeezed in the hand, then broken apart and examined.

In the present instance the sample is extremely sticky, indicating an abonormal clay content. In addition to interfering with the permeability, the clay content reduces the general refractoriness. This combination is bound to produce scabs, blows and a general dirty surface. Also, and this is a more serious feature, most of the sand dislodged from the surface will appear later during the machining operation. Casual examination of the hand-squeezed specimen leads us to doubt the accuracy of your permeability test which showed a reading of 90 to 100. Offhand and without an official check we are inclined to the opinion that a decimal point has been overlooked in these figures.

Range of Hardness Is Too Low

Q.—We are making some gray iron castings which have to be heat treated to a Rockwell C 49-53 hardness. Castings vary in size from 5/8-in. thick and 4 in. square with a 2-in. hole in the center up to 1 3/8-in. thick and 8 in. square with a 3-in. center hole. Metal contains about 1.50 per cent Si, 0.78 per cent Mn, 0.05 per cent S, and 0.09 per cent P. After heat treating the Rockwell C hardness is 46-49. Our combined carbon ranges from 0.55 to 0.65 per cent, and the customer thinks that if we can get the combined carbon up to 0.80 per cent, the hardness will get into the desired range. Do you have any recommendation on a mixture for a type of iron for heat treating? Also how can we increase our combined carbon?

A.—With reference to the inquiry on heat treatment it should be pointed out that while information is given on the composition of the iron, nothing is said on the heat treatment procedure. The hardness range you mention converted into brinell hardness numbers would be from 464 to 525 approximately, and it might be possible to attain that by heating the castings to 1750° F and holding until all parts of the castings are at the temperature. Then they are quenched in water without delay. Castings of course, should be inserted in the quench bath, edge first, and maintained that way. However, such a quench may be too drastic, resulting in cracks.

If any uniformity in results is expected, it would be advisable to consider some adjustment in composition so that the two sizes of castings mentioned will have somewhat the same structures as cast. While

ANSWERS

probably not an exact relationship as to exact cooling rate, a comparison of the volume-areas of the 4 x 4 and 8 x 8-in. castings indicates that the smaller will cool approximately 2½ times as fast as the larger, and hence would show a much finer grain structure as well as a higher combined carbon content. A reduction in silicon for the larger castings of 0.25 to 0.30 per cent or possibly more might bring the structure more into line.

As far as increasing the combined carbon content in the castings is concerned, that can be accomplished by reducing the silicon content or increasing the rate of cooling by use of chills. However, while that will aid in increasing the as-cast brinell or Rockwell hardness numbers, it will not have much effect on the hardness obtained after heat treatment if by that is meant raising to a temperature sufficiently high to bring all the carbon into solution, and then quenching in some medium such as air, oil or water. Final hardness will depend upon the quenching temperature and quenching medium. Highest hardness is obtained with high quenching temperature and water.

Difficulty with plain gray irons quenched in water, as previously mentioned, is cracking, and in addition trouble is encountered in obtaining uniform results due to the rapidity with which structural transformations occur. Hence, the usual procedure is to employ alloying agents which slow down the rate of transformation, such as various combinations of nickel, chromium and molybdenum. For example, you might try additions of 1 per cent nickel and 0.50 per cent chromium; 0.70 per cent molybdenum and 0.50 per cent chromium. Possibly the desired results might be secured with lower alloy contents.

Suggests Causes of Porosity

Q.—We are enclosing for your examination a section cut from an enameled cast iron bathtub. As you will note, the area enameled imperfectly due to an odd condition of localized surface porosity in the iron. The iron has approximately the following analysis: Si 3.12 per cent, Mn 0.59 per cent, S 0.094 per cent, and TC 3.28 per cent.

A.—The subsurface porosity exhibited in the section of bath tub submitted for examination may result from two causes. One is a sand condition which generates a small amount of steam or gas which penetrates the metal just prior to the formation of the skin. The other is gas in the metal itself resulting from use of a damp ladle or one with a newly patched pouring lip. While faulty sand conditions usually give external evidence in the form of surface blows, under certain conditions as indicated, where the amount of steam or gas is small the trouble just results in pin holes. Also one might expect the defect to appear more widespread. However, it will show in isolated areas when sand or clay balls, foreign organic material such as pieces of wood, lunchbox debris, etc., or pieces of tramp iron are at or close to the mold faces.

Similarly in the case of gassed iron one would expect the subsurface pinholes to be widely distributed, but there again certain factors will operate and result in isolated appearances. The comparatively thin section involved means rapid cooling rates which will result in the gas being held in solution except near the gate region where the speed of solidification is slower. Again, if the gas is developed by a wet patch on the ladle lip only the first portion of the iron passing over it will be affected.

Metal Cold in the Second Tap

Q.—In our cupola relined to 30 in., we start the blast at 2:30 p.m. and tap out the first iron at 2:45. Tap hole and slag hole are plugged just before the blower is started. The first tap yields about 1000 lb iron. Usually the iron from the first tap is hot, but the second tap about 7 minutes later is so cold we have to use a sledge hammer and sharp pointed bar to open the tap hole. One day recently the fire was lighted one hour earlier than usual. The iron from the first tap was so hot it lifted the lining in the receiving ladle, but the second tap as usual was cold. We had to use the hammer and bar.

A.—A wet, hard sand bed, a low coke bed, a blast that either is too high or too low, either singly or in

GANGWAY!

By J. A. PATTERSON

"He accidentally got some sand down his back, so we're shakin' it out of him!"

combination, will produce cold iron at the beginning of the heat and may have an adverse influence on the entire heat. All these factors appear to be absent in your case since you get blazing hot iron on the first tap. Logically the second tap and succeeding taps should be as hot as the first. We are wondering if you are following a practice that met with some favor here and there many years ago. A double charge of iron was placed on the bed coke. According to the theory a high bed should work satisfactorily. It did work satisfactorily, provided the first coke split was heavier than usual to compensate for the distance the bed burned away in melting the overdose of iron.

Another item that may or may not have a bearing on your problem, is mentioned as a possibility. You probably use the same blower on the small diameter cupola that was used on the cupola when the diameter was larger. If that is the case the blower should be throttled down to suit the smaller unit. A high blast will burn the coke away too rapidly and cool the iron. Melting speed for a 30-in. diameter cupola is 7000 lb per hour under normal conditions and with good coke. This requires 1400 cfm air at a pressure of about 8 oz.

Make High Lead Bearing Alloys

Q.—We would like to obtain information on the best method of producing high grade leaded bearings of the following approximate analyses: 20 per cent Pb, 8 per cent Sn, remainder Cu, and 30 per cent Pb, 4 per cent Sn, and remainder Cu. We would like to have preferred melting and pouring temperatures, best alloying procedure with any comments as to the virtues of S additions as well as methods of cooling castings. Is quenching practiced?

A.—Production of high-lead alloys such as you mention is not too difficult provided the tin content is maintained at such a point that it is all in solution in the copper as the alpha phase. Naturally the alloy must be melted so that it is not subject to gassing, and it should be poured at the lowest temperature which still will provide sound castings. The lead is not soluble, but is suspended in finely divided form throughout the alloy, and must be so maintained when it freezes.

Often 1 per cent nickel is added to those alloys to aid in keeping the lead in suspension, and likewise chill casting is employed to speed the rate of cooling. Sulphur in the form of stick sulphur plunged in the bath or as barium sulphate or calcium sulphate (plaster of paris) and charcoal as a cover was employed and probably still is, as an aid to keeping lead in silution. However, as Clamer proved years ago, if the tin to copper ratio is held to 9 to 91 or less, use of sulphur or other fourth element was not required.

Method of alloying when virgin metals are used is to melt the copper, add the lead, and then the tin. Alloy should be melted hot, and allowed to cool to the desired pouring temperature, which may range from 1850 to 2200 ° F; using, of course, the lowest possible temperature. If there is any possibility that the alloy was gassed during melting, addition of about 1½ oz of either copper or lead oxide per 100 lb metal 3 to 5 minutes before pulling the pot will help eliminate gas holes. Previous to pouring the alloy should be stirred well with a pumping motion to insure thorough distribution of the lead.

Melt Brass Borings in Cupola

Q.—A suggestion has been made that we melt machine shop brass turnings and borings in a cupola and pour the resulting metal into ingots for use in our induction type electric furnaces. The oily chips create an objectionable smoke nuisance when charged directly into the electric furnaces. On an experimental basis we have run batches of the material through an oil fired rotary type furnace designed primarily for refining dust collector recovery of grinding and polishing operations. However, this equipment is fully employed for the original purpose. Additional equipment would be required for the de-oiling process. We shall appreciate your opinion on the feasibility of melting the borings and turnings in the cupola.

A.—Considering the many remarkable and seemingly impossible foundry developments in recent years, we hesitate in claiming that brass borings and turnings cannot be melted satisfactorily in the cupola. However, what knowledge we have on the subject indicates that the process is outside the range of practical accomplishment. Although the practice is not common, bronze scrap and ingots have been melted in the cupola with a rather heavy loss in tin and zinc content. These metals are added in the ladle to compensate for the furnace loss.

The larger zinc content in brass automatically rules the cupola process out as impracticable and decidedly uneconomical. In our opinion you have a choice of: 1—Install an open-flame furnace under a hood and smoke stack. 2—Sell the borings and turnings to a firm engaged in the production of ingots from miscellaneous material. We favor the second alternative. With the present wave of sentiment toward the abatement of the smoke nuisance, particularly in settled communities, you should give due consideration to that phase.

Make Iron in Electric Furnace

Q.—We recently purchased a used arc furnace (500 lb capacity) and plan to enter the ferrous casting field making gray iron machinery castings ranging from 1 to 300 lb in weight. Can you supply us with information on methods and materials for such work? We have had many years experience in producing plain carbon and alloy steels with the high-frequency induction furnace.

A.—With the electric arc furnace as the melting unit, you are in a position to use a wide variety of raw materials to produce gray iron, provided you also are including a chemical laboratory to perform the

(*Concluded on page* 104)

NDC Model ROYER COMBINATION Scrap Remover and Sand Separator and Blender preparing backing sand for snap molding unit at York, Pa., foundry.

WHAT IT DOES *Automatically*

- Feeds from bucket loaded hopper to machine;
- Removes scrap, gaggers, burnt cores, trash;
- Reduces heap sand to smooth, even texture, free of lumps . . . to assure fine, velvety textured sand for production of highest grade castings;
- Blends old sand, new sand and bond;
- Provides correct moisture distribution;
- Increases permeability from 10 to 20 points;
- Double aerates and degasses sand mixtures.

Plan for bigger production in 1950

with a ROYER COMBINATION Scrap Remover and Sand Separator and Blender

Start the New Year right by getting rid of the all-too-expensive hand shoveling operations in your sand preparation department. Go to complete sand mechanization with a ROYER COMBINATION, and get your production costs in line with other fully mechanized foundries.

A ROYER COMBINATION is portable. Move it about from bay to bay with an overhead crane . . . or carry the sand to it in a grab bucket. Two sizes . . . the NDC with 20-25 tons per hour capacity for medium size foundries . . . the RC for large foundries needing 40-50 tons per hour. Write for catalog. There's a Royer machine for every size foundry.

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

159 PRINGLE ST., KINGSTON, PA.

Questions AND ANSWERS

(*Concluded from page* 102)

necessary analyses to follow the progress of the heat. Raw materials include pig iron, cast iron scrap, steel scrap, various ferroalloys, petroleum coke, and fluxing materials such as lime and fluorspar. Since you apparently are without experience in operating the arc furnace, it might be wise to secure the services of an operator skilled in that work, and eliminate a lot of headaches and experimental heats.

At the beginning it may be wise to employ pig and scrap mixture which will result in the desired final composition, and as your experience in operating the furnace increases, you can change to those raw materials which will give the lowest cost iron at the spout. Usually all-scrap mixtures, with suitable additions of ferroalloys to bring about the proper range of the various elements, are those with the lowest cost. With pig and scrap charges the carbon usually is high enough, but when high steel scrap charges are used, it is necessary to add petroleum coke, scrap electrodes or other carbonaceous material to make up the deficiency. Such material is placed on the furnace bottom and the metallic part of the charge placed on top.

In melting the power input is held to as low a value as possible which will provide a constant arc with minimum surging. From time to time it may be necessary to push unmelted pieces from the sides to the center of the furnace. When all the material is melted, the current input is increased to raise the temperature of the bath to around 2600° F, and at that point any slag and coke should be raked off. Sufficient lime is added to form a thin blanket over the bath, and a small amount of fine petroleum coke added. If the slag tends to become gummy, additions of fluorspar are made to thin it out.

As soon as the slag has formed, test pieces are poured and examined by fracture and chemical analysis. Appearance of the fracture of a 1-in. bar will give some indication of the condition of the metal—soft iron being indicated by a grayish-black structure, and harder iron by a silvery fracture. After receiving the laboratory report on composition, the necessary adjustments are made by addition of ferroalloys, and the temperature of the bath increased to that required for pouring.

While you mention that you expect to pour castings weighing from 1 to 300 lb in weight, it might be well to point out that the determining factor is not the weight, but the section thickness. You will not be able to make castings ¼-in. thick and 2 in. thick from the same composition. In the case of the thin castings, the silicon content will be around 2 per cent while in the 2-in. section casting it will be in the neighborhood of 1.5 per cent.

Similarly, the same type of molding sand would not be used over such a wide range of castings although it might be possible through use of a sufficiently open backing sand for the heavy work as the base, and employing suitable facing sands compounded to meet surface finish requirements on the medium and light castings.

Open Grain Causes Rejection

Q.—We are forwarding for your inspection a piece of a gray iron drum casting rejected by a customer on account of the coarse, open grain of the metal. The casting weighs about 1000 lb. It is 2 in. thick in the rough state. The diameter is reduced ⅝ to 1-in. on the face where the grooves are cut in the machining process. Analysis of the metal shows TC 3.34 per cent, GC 2.62 per cent, Si 1.70 per cent, Mn 0.76 per cent. Facing sand for the mold contained seacoal 1-8 and pitch compound 1-20. Face of the mold was sprayed with wet blacking bonded with a water-soluble binder. The mold was skin dried with a torch. The analysis conforms approximately to that usually found in castings of this kind. Do you think the mold material was responsible for the condition of the metal?

A.—The analysis, as you point out, is similar to that of other castings in the same general classification, but the fracture bears a very strong resemblance to that of pig iron with a 3 to 4 per cent silicon content. Offhand and without any further information on the subject, we should be inclined to the opinion that no steel was included in the cupola charge. The usual crane drum charge contains approximately 30 per cent steel. However, we agree with your opinion that the mold was responsible. The sand contained so much combustible material, 12.3 per cent seacoal and 5 per cent pitch compound, that the casting was enclosed in a red hot casing. This delayed the setting time, and promoted the formation of free graphite and large crystals, or in ordinary foundry language open and coarse grain metal.

Seacoal is not needed in facing sand that is skin dried. The pitch compound is sufficient in the majority of instances, but may be replaced with noncombustible material in a mold for a thick, heavy casting. A fairly open grain sand wet down with thin claywash will serve satisfactorily. Painted with wet blacking and dried carefully and properly, the facing will stand up against the molten metal, and afterward strip clean from the casting.

Flanged Casting Shows Holes

Q.—We are forwarding for your examination a small gray iron section broken from the flange on a furnace ring. This flange is positioned in the drag section of the mold when cast. Can you tell us what causes this spongy appearance with smooth shiny holes?

A.—The Swiss cheese appearance in the specimen submitted apparently is due to gas developed in the mold and injected into the casting. Probably the sand was a little too tight or perhaps rammed too hard which prevented the free escape of gases through the mold. The fact that the holes are shiny probably is due to the presence of seacoal in the facing sand employed. When organic matter is not present the interior of the holes tends to show a dull discolored surface.

Suppose your foundry employed less than 100 . . .

If your foundry employed less than 100 workers, would you unload annealing cars with a sling—or with a magnet?

The profitable answer to this question is determined neither by size of your plant nor investment involved. Consider, instead, your *total* unloading time. Fully 50% of it is consumed in attaching and removing wire or chain slings from castings.

With an Ohio Magnet, however, you lift *instantly*. There's no lost time before and after the move. The man-hours you save pay for magnet cost in a few short months.

Save time . . . save money by turning costly man-hours into profitable magnet-minutes. Write to Ohio—*25 years a leader in magnetic materials handling.*

How would you unload annealing cars?

SELECT YOUR MAGNET from two Ohio types. The PROTECTO-WELD magnet, shown above, is made in 39, 46, 55 and 65-inch diameters. Bolted construction types include these and other smaller sizes. Ohio also builds magnet control equipment.

5 TYPICAL JOBS WHERE OHIO MAGNETS CUT COSTS

- unloading scrap, rails and pig iron.
- loading charging cars, hoppers and buckets.
- loading and unloading annealing cars.
- moving bulky castings in cleaning dept.
- picking up sprues, gates, runners, overflow.

ohio MAGNETS

THE OHIO ELECTRIC MFG. CO. • 5900 MAURICE AVENUE • CLEVELAND 4, OHIO

A-2029

Men OF INDUSTRY

RUDOLPH NUSKE has been made superintendent, gray iron foundry, Budd Co., Detroit succeeding the late Glenn Hamilton. Mr. Nuske entered the foundry industry in 1918 when he joined United Engineering & Foundry Co., Canton, O. Five years later he became associated with Whitehead & Kales Inc., Detroit, and in 1932 was appointed foreman, Ecorse Foundry Co., Ecorse, Mich. He joined the Budd Co. in 1935, becoming assistant superintendent two years ago.

• • •

G. K. Eggleston has been appointed vice president in charge of manufacturing and **S. E. Gregory**, general sales manager, Non-Ferrous Mold Inc., a corporation recently formed by Barnes Mfg. Co., Mansfield, O., and the Non-Ferrous Die Casting Co. Ltd., London, for production of permanent mold castings. Mr. Eggleston, who was graduated from Michigan College of Mining and Technology, was associated with Detroit Lubricator Co. from 1922 to 1941, when he joined Barnes Mfg. Co. as engineering vice president. Mr. Gregory, a native of London, was graduated from Kilborn Polytechnic with degrees in mechanical engineering and economics. He has been associated for 12 years with Non-Ferrous Die Casting Co., London, where he has specialized in permanent mold casting of all the nonferrous alloys.

• • •

Frank E. Bates, recently associated with the Buffalo Works of Worthington Pump & Machinery Corp., has joined the Solvay Sales Division, Allied Chemical & Dye Corp., New York, as foundry consultant, with headquarters at 26 Ruspin Ave., Buffalo. Mr. Bates attended the University of Buffalo and at one time was assistant general foreman of coke ovens at Bethlehem Steel Co.'s Lackawanna plant. Later he became melting supervisor of American Brass Co. at Detroit and served in a similar capacity for the last 14 years with the Worthington corporation at Buffalo. Mr. Bates is a past chairman of the Western New York Chapter, AFS.

• • •

Rene Deprez, until recently president of the Association Technique de Fonderie de Belgique, and **Edwin Commins,** formerly its general secretary, have resigned their offices following several years of service. Both have been retained as members of the council of the foundrymen's group. **Ivan Lamoureux,** one of the founders of the Belgian association in 1911, has been elected president to succeed Mr. Deprez, and **Jacques Foulon** has been appointed successor to Mr. Commins. His address as secretary of the association is 195, rue Saint Leonard, Liege, Belgium.

• • •

Elden L. Auker has been appointed assistant district manager in the Michigan territory of Bay State Abrasive Products Co., Westboro, Mass. Mr. Auker, a graduate of Kansas State University, joined the company two years ago as an abrasive engineer. Prior to that he was Detroit district manager for Mid-West Abrasive Co., Owosso, Mich. Previous to his grinding wheel experience he was a pitcher for the Detroit Tigers, starring for them in 1934 when they won the American League pennant and in 1935 when Detroit won the pennant and the World Series.

• • •

E. B. Hansen has resigned as secretary and general manager, Wisconsin Appleton Co., South Milwaukee, Wis., captive malleable iron foundry for the Appleton Electric Co., Chicago. Mr. Hansen plans an extended vacation before resuming active duties again.

• • •

John Rush, formerly foundry superintendent, Elkhart Brass Mfg. Co., Elkhart, Ind., has been appointed foundry superintendent, Globe Valve Corp., Delphi, Ind., succeeding **Donald May,** who has left the company.

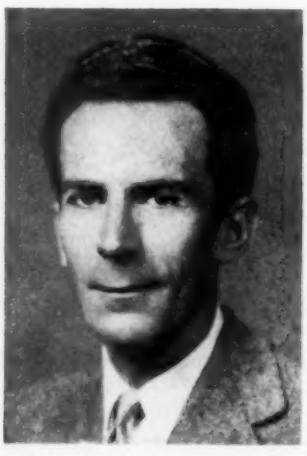
• • •

H. R. Salisbury has been named president, Air Reduction Sales Co., New York, following 23 years of association with the company in various executive capacities. The following have been appointed vice presidents: **H. F. Henriques,** general sales; **J. J. Lincoln Jr.,** railroad sales and

(*Continued on page* 108)

RUDOLPH NUSKE

G. K. EGGLESTON



S. E. GREGORY

FRANK E. BATES

Sly Dust Filter mounted over Sly Blast Room

SLY DUST CONTROL

Removes THE *DUST* HAZARD—WIDELY USED, *NOT* EXPENSIVE

THE Sly Dust Filter (shown at left) handles the dust created by a Sly Blast Room, grinder booths, and surface grinders.

It does a thorough filtering job—actually *filtering* the dust out of the air by passing it through a series of cloth bags ingeniously arranged in a compact space within the filter case. The cleaned air contains no visible dust.

Sly Dust Filters comply fully with the requirements of the laws and regulations of the various states. They help provide better working conditions—increase production. Thousands of successful installations. Sly Dust Control is *not* expensive.

Send for Bulletin 98 and tell us about your problem so that we can write you fully.

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Representatives in New York • Chicago • Philadelphia • Detroit • St. Louis
Toronto • Minneapolis • Cincinnati • Rochester • Los Angeles • Birmingham

Men OF INDUSTRY

(*Continued from page* 106)

sales services; **S. B. Stouffer,** distribution; **N. L. Wisser,** field office management. Other officers of Air Reduction Sales Co. are: **C. G. Andrew,** vice president, operating; **J. D. Gunther,** secretary; **W. Winters,** treasurer; and **J. E. Slater,** controller.

♦ ♦ ♦

N. B. Ornitz has been named manager of foundry operations in the Pittsburgh district, Blaw-Knox Co., in addition to his duties as vice president of the company. Mr. Ornitz founded the National Alloy Steel Co., Blawnox, Pa., in 1927, which became part of the Blaw-Knox Co. in 1929. He was named a director of the company in 1935 and vice president two years later.

♦ ♦ ♦

S. Franklin Swain, chairman of the Central Indiana Chapter of the AFS for the year 1949-50, is assistant secretary-treasurer, Golden Foundry Co., Columbus, Ind., manufacturer of gray iron castings. Mr. Swain received a degree in mining and metallurgy from University of Illinois in 1928. He served as a director of Central Indiana Chapter last year.

♦ ♦ ♦

Edwin A. Swensson has been appointed sales and service engineer for the National Engineering Co., Chicago, and will handle sales in the state of Michigan and in the cities of Toledo, O., and Windsor, Ont. Mr. Swensson, who studied at Illinois Institute of Technology, has had experience as a sales engineer of conveyor equipment as well as in foundry engineering. He has been associated with National Engineering Co. for 7 years and will maintain an office at 2970 W. Grand Blvd., Detroit.

♦ ♦ ♦

Wayne Karber has been appointed sales engineer in charge of cast stainless steels, William G. Boales & Associates, Detroit, manufacturer's representative. Mr. Karber, a graduate of Michigan State College, will handle the line of valves, fittings, accessories and engineered castings manufactured by Cooper Alloy Foundry Co., Hillside, N. J., which the Boales company represents.

WAYNE KARBER

♦ ♦ ♦

J. L. Lessman, formerly salesman in the New Jersey territory, Cooper Alloy Foundry, Hillside, N. J., has been appointed manager of valve and fitting sales for the company. Following graduation from Missouri School of Mines and Metallurgy, Mr. Lessman took graduate work at University of Pittsburgh, while working at Fort Pitt Steel Casting Co. He joined American Steel Foundries as general foundry foreman in 1945, and a year later became assistant foundry superintendent, Cooper Alloy Foundry Co.

♦ ♦ ♦

Joseph M. Schapper, formerly industrial education director, National Metal Trades Association, has been appointed industrial relations director at the Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. Mr. Schapper, who will be in charge of labor-management relations in all company plants, will be assisted by **I. E. Rice,** and **Harold J. Workman,** personnel directors of the foundry.

♦ ♦ ♦

Alex Zuk has been appointed engineer in the arch and wall sales division, Laclede-Christy Co., St. Louis, with headquarters in New York. Mr. Zuk has been associated with Westinghouse Electric Corp., Pittsburgh, for the last 10 years. Prior to that he was connected with Iorio Construction Co., Newark, N. J., for two years.

♦ ♦ ♦

Nils Anderson Jr. has been named vice president, Debevoise-Anderson Co., New York. Mr. Anderson, who until recently was vice president, Chemical Division, Borden Co., New York, was associated with Bakelite Corp., before the war, and later became a director of Debevoise-Anderson, a post he still holds.

♦ ♦ ♦

George E. Johnson, since 1915 associated with New York Air Brake Co., Watertown, N. Y., has been appointed foundry superintendent, succeeding **L. W. Curtis,** who has retired following 22 years of service.

♦ ♦ ♦

John L. Sinclair has been appointed Cleveland district manager of the Mechanical Goods Division, Goodyear Tire & Rubber Co., Akron, O. Mr. Sinclair, who attended Northwestern University, joined Goodyear in Chica-

(*Continued on page* 111)

N. B. ORNITZ

S. FRANKLIN SWAIN

EDWIN A. SWENSSON

J. L. LESSMAN

You can tell the difference

. . . with your eyes shut!

The Robins Floatex Shakeout shakes the flask—not the building

You don't have to look at the name to recognize a Robins Floatex Shakeout when it's running.

The mere fact that you don't feel the building shake tells you at once that it's a Robins. And therein lies the big basic difference between a Robins Floatex and any ordinary shakeout!

No shaking effort is wasted with a Robins Floatex Shakeout. It shakes the flask—not the building! This is because it is the only *full-floating* foundry shakeout. The live frame and load *both* ride on big coil springs.

Naturally, you'd expect this full-floating principle to save wear and maintenance expense. And users' records prove that it does.

A Robins Floatex Shakeout offers you many other important money-saving features, too. For example, you can use it to knock out cores . . . right in the same operation with your flask shakeout!

Why not let a Robins engineer explain how the Robins Floatex Shakeout can make a big difference in *your* foundry output? Write Robins Conveyors Division today.

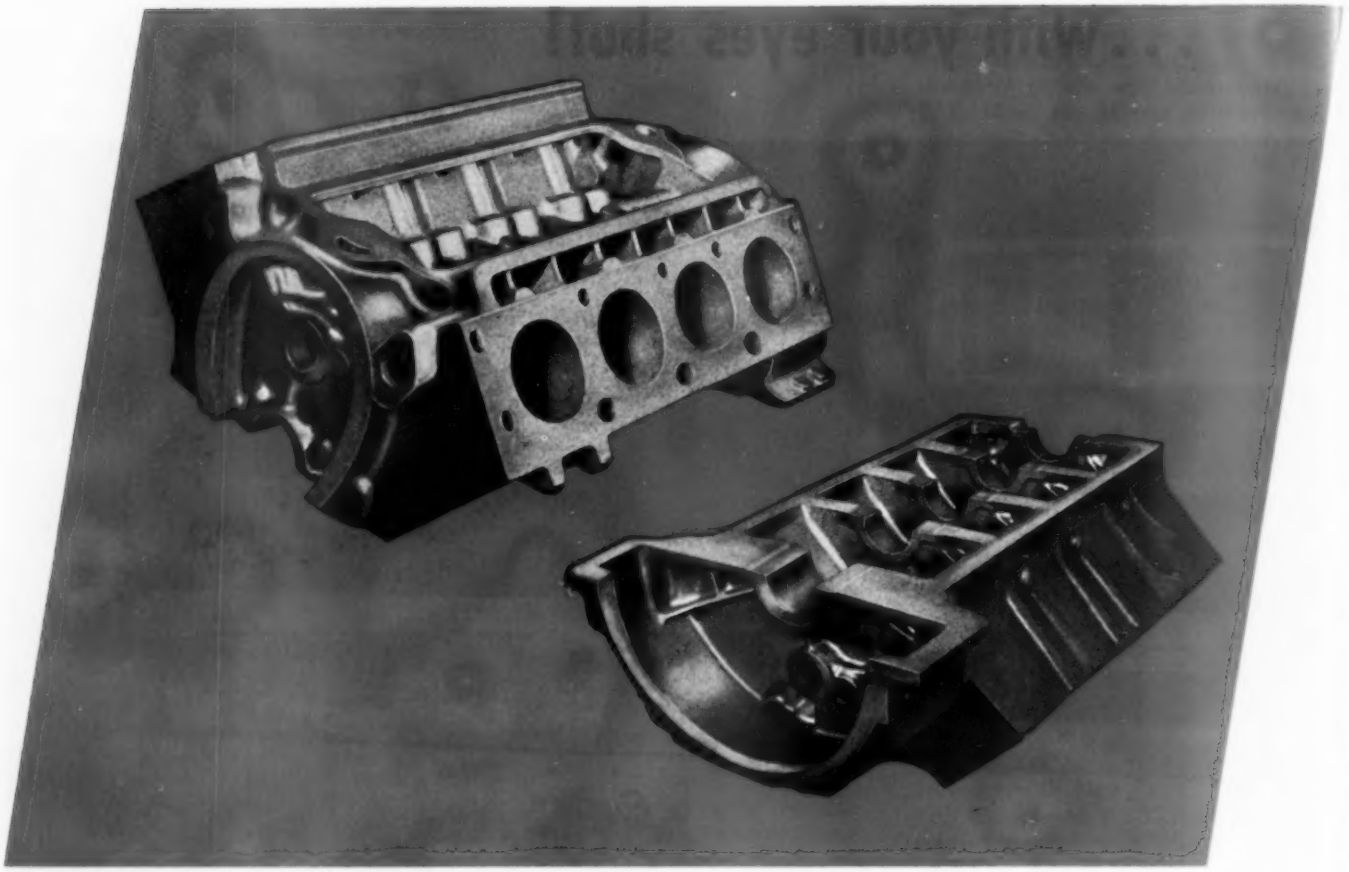
SEND TODAY for Bulletin 124-B. Gives you a complete picture story of benefits you enjoy with portable, stationary or self-discharging Robins Floatex Shakeout. Write Robins Conveyors Division, 270 Passaic Ave., Passaic, N. J.

ROBINS

FLOATEX SHAKEOUT

ROBINS CONVEYORS DIVISION **HEWITT-ROBINS INCORPORATED**

Another Engineering Achievement by BUFFALO PATTERN WORKS



These New Motor Blocks Are Made With High Accuracy Buffalo Pattern Works Equipment

Buffalo Pattern Works recently completed several duplicate sets of machined, high-speed production equipment to produce this late model cylinder block with a low scrap ratio and low machining cost. This brand of skill has been the hallmark of Buffalo Pattern Works for over 56 years.

We invite you to consult us regarding your production pattern requirements.

Since 1893

BUFFALO PATTERN WORKS

830 HERTEL AVE. BUFFALO, N. Y. RI. 3512

(*Continued on page* 108)

go as a mechanical goods salesman in 1924. He became Milwaukee branch operator in 1930, and was subsequently transferred to Atlanta in 1932, and to Birmingham the following year.

♦ ♦ ♦

Jack Victorine, associated for 17 years with the stainless casting department, Cooper Alloy Foundry Co., Hillside, N. J., has been named general sales manager of the company. He has served as sales manager for the past 8 years. **Morton C. Meyers,** who joined the company 12 years ago and has served as direct assistant to Mr. Victorine since 1945, has been named assistant sales manager.

♦ ♦ ♦

Clyde O. Penney, currently serving as chairman of the Timberline Chapter of the AFS, has been metallurgist, C. S. Card Iron Works Co., Denver, since 1943. Mr. Penney, a native of Colorado Springs, Colo., was graduated from Colorado School of Mines in 1936 with a metallurgical engineering degree. He served as weight control engineer and inspector, Boeing Airplane Co., Seattle, for 3 years, when he returned to Colorado School of Mines for graduate study. Following a year in the heat treating section of the materials laboratory, Wright Aeronautical Corp., Paterson, N. J., he joined Card Iron Works Co. in 1941, as assistant metallurgist. Mr. Penney served as a director of the Timberline Chapter last year.

♦ ♦ ♦

Edwin M. Perrin has been appointed advertising manager, Hewitt-Robins Inc., New York, and will coordinate the advertising of its four divisions: Robins Engineers, Robins Conveyors, Hewitt Restfoam and Hewitt Rubber. Mr. Perrin who joined the Hewitt-Robins organization in 1942, has previously served as advertising manager, Robins Conveyors Divisions, and is a member of the public relations committee of the Foundry Equipment Manufacturers' Association. **A. P. DeVita,** for the past four years foundry production manager, Robins Conveyors Division, has been appointed New York district sales manager. Mr. DeVita, who has spent 14 years in the foundry industry, was associated for ten years with Wright Aeronautical Corp., where he acted as foundry supervisor during the war.

♦ ♦ ♦

Kurt A. Miericke, Evanston, Ill., has been appointed Chicago district representative of the Michigan Oven Co., Detroit. Mr. Miericke's territory includes northwestern Indiana, northern Illinois, Wisconsin and Iowa. Well known in the foundry industry, Mr. Miericke recently had been development engineer with U. S. Gypsum Co., Chicago, doing development work on gypsum base casting plaster.

♦ ♦ ♦

William M. Ball III, until recently associated with Cincinnati Milling Machine Co., Cincinnati, has been appointed consulting engineer on the technical staff of Harry W. Dietert Co., Detroit, where he will devote the major part of his time to research work on molding materials. Previous connections include Motor Castings Co., Milwaukee, and Williamson Heater Co., Cincinnati.

♦ ♦ ♦

Cecil R. Pond has been appointed sales representative in Alabama and northwestern Florida, for Automatic Transportation Co., Chicago, with headquarters at 625 Comer Bldg., Birmingham. He has been associated with Automatic since 1945, as sales and service engineer for the E. H. Fairchild Co., Birmingham, one of its industrial truck distributors.

Men OF INDUSTRY

Fred H. Haggerson, president, Union Carbide & Carbon Corp., New York, was presented the 1949 Medal for the Advancement of Research, by the American Society for Metals at its annual banquet Oct. 20. Mr. Haggerson was cited as an outstanding example of the modern executive in manufacturing enterprise employing industrial research as an effective aid in achievement of commendable business objectives.

♦ ♦ ♦

C. K. Banks has been named director of research, Metal & Thermit Corp., New York, with headquarters in its laboratory, Woodbridge, N. J. Dr. Banks formerly headed the chemotherapy division of the Parke Davis & Co. research laboratories, Detroit, which he joined in 1940 as a research chemist. Following graduation from University of Nebraska he did research work there until 1936 when he received his Ph.D. degree.

♦ ♦ ♦

T. E. Anderson has been appointed district sales manager of the Chicago office of the Ohio Ferro-Alloy Corp., Canton, O. This fills the vacancy created by the death of B. A. Patch, Jr. in October. Mr. Anderson has been handling Central District sales out of the main office at Canton.

♦ ♦ ♦

J. A. Arter has been appointed assistant general manager, Ampco Metal Inc., Milwaukee. Mr. Arter, who joined the company in 1937, has been staff assistant to the general manager since 1945.

(*Concluded on page* 115)

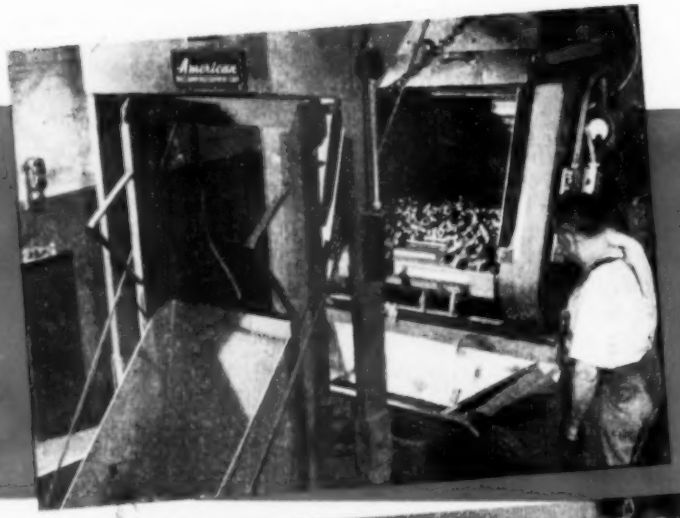
JACK VICTORINE

CLYDE O. PENNEY

A. P. DE VITA

EDWIN M. PERRIN

Wheelabrator® saves



SMALL

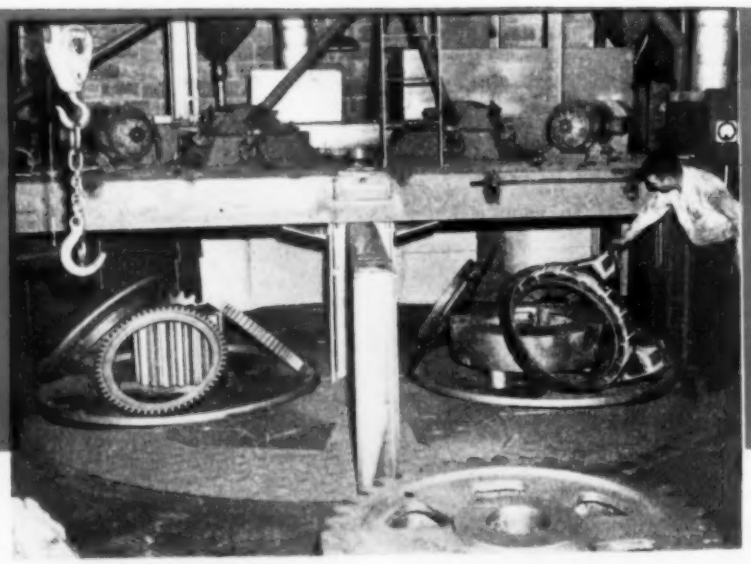
WHEELABRATOR SAVES
$1108 a year for the Welsbach Corp.

Savings resulting from the installation of a Wheelabrator Tumblast at the Kitson Division of the Welsbach Corporation have more than repaid the investment. The Wheelabrator now cleans castings in three to four minutes that formerly required 45 minutes by the old method.

MEDIUM

WHEELABRATOR SAVES
$4777.50 a year for Auto Stove Works

One Wheelabrator replaced 8 tumbling mills at the Auto Stove Works, New Athens, Illinois and reduced cleaning costs $95.55 per week. It cleans castings so thoroughly that tools now last longer and the overall efficiency of the foundry has been improved.



LARGE

WHEELABRATOR SAVES
$10,275 a year for
Sawbrook Steel Castings Co.

The Wheelabrator Twin Table, installed at Sawbrook Steel Castings Co., is effecting a direct traceable savings of $41.10 every working day. This machine cleans castings weighing from 50 lbs. to 3500 lbs. each. It has reduced operating and maintenance costs to a minimum.

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

s money for any size foundry

	FORMER METHOD	WHEELABRATOR METHOD	
MACHINE	Two wet tumblers	27″ x 36″ Wheelabrator Tumblast (5 cu. ft. capacity)	SAVINGS $2.31 per ton $1108.00 per year
PRODUCTION	1.74 tons daily	1.92 tons daily	
COST per ton	$6.75	$4.45	
MACHINE	8 tumbling mills	36″ x 42″ Wheelabrator Tumblast (11½ cu.ft. capacity)	SAVINGS $1.47 per ton $4777.50 per year
PRODUCTION	12 tons in 9 hours	13 tons in 7 hours	
LABOR REQUIREMENTS	3 men @ 9 hours (27 man hours)	1 man @ 8 hours (8 man hours)	
MACHINE	Airblast Room and Humane Airblast Table	72″ Wheelabrator Twin Table with three Wheelabrator Units	SAVINGS $1.37 per ton $10,275.00 per year
PRODUCTION	30 tons daily	30 tons daily	
LABOR REQUIREMENTS	6 men, 50 man hours daily	3 men, 24 man hours daily	
COST per ton	$4.75	$3.38	

This new, informative book gives complete, concise information on all phases of Wheelabrator airless blast cleaning. Write today for Catalog No. 74-A.

American

WHEELABRATOR & EQUIPMENT COR

505 S. Byrkit Street — Mishawaka 2, India

EVERYWHERE

—in hundreds of foundries—large and small—all over this great country of ours

***YOU WILL FIND* "ACCURATE"**

Pressure cast MATCH PLATES—COPE AND DRAG SETS and CORE BOXES

GREATLY INCREASE CASTING PRODUCTION, WHILE MATERIALLY REDUCING COSTS

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Los Angeles, Cal., McGowan Co., Inc., Trinity 2057;
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Write for Descriptive Brochure and Lay-out Sheets; or forward Master Patterns or Blue-Prints for our QUOTATIONS.

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Men OF INDUSTRY

(*Concluded from page* 111)

O. B. J. Fraser, assistant manager, Development and Research Division, International Nickel Co. Inc., New York, has been elected president of the American Welding Society, New York. Mr. Fraser, a graduate of Queen's University, Kingston, Ont., joined International Nickel Co. in 1917 as metallurgical engineer at the Bayonne, N. J., works. Following numerous supervisory positions in the Port Colborne, Ont., works, he was placed in charge of the research laboratories at Bayonne in 1924, where he remained for 8 years. Later he became director of technical service on mill products and carried on field development work in the use of nickel alloys in the petroleum industry.

♦ ♦ ♦

Lester C. Fill, assistant general superintendent in charge of public relations, Geo. D. Roper Corp., Rockford, Ill., is the present chairman of the Northern Illinois-Southern Wisconsin Chapter of the AFS. Mr. Fill, who was born in Belvidere, Ill., joined the Roper company in 1926, as a timekeeper. He became foreman in charge of the cleaning room in 1936 and in 1943 was appointed general foreman in charge of all shell production. Two years later he was named general foundry superintendent and in 1948 became assistant general plant superintendent in charge of public relations. Mr. Fill served as vice chairman of the Northern Illinois-Southern Wisconsin Chapter last year.

♦ ♦ ♦

Ward A. Miller, vice president and director, Vanadium Corp. of America, New York, has been placed in charge of administering and co-ordinating the activities of the company's selling and technical divisions dealing with commercial affairs. **Gustav Laub,** until recently assistant vice president-general manager of sales, has been elected vice president in charge of sales. Through error the names of Messrs. Miller and Laub were transposed beneath their pictures in the November issue.

♦ ♦ ♦

James H. Newman, president, Newman Foundry Supply Ltd., Montreal, Quebec, is the present chairman of the Eastern Canada Chapter of the AFS. Mr. Newman, who was graduated from Huntingdon Academy and Montreal Technical School, joined Crane Ltd., Montreal, in 1928. He served in the pattern and tools division from 1931 to 1937, when he joined Canadian Foundry Supplies & Equipment Co. Ltd., Montreal, and Toronto, Ont. He later organized and became president of his own company. Mr. Newman served as vice chairman of the Eastern Canada Chapter last year.

JAMES H. NEWMAN

♦ ♦ ♦

Thomas D. Jolly, vice president in charge of engineering and purchases, Aluminum Co. of America, Pittsburgh, was re-elected president of the American Standards Asosciation at the 31st annual meeting in New York, Oct. 11-14. **Harold S. Osborne,** chief engineer, American Telephone & Telegraph Co., New York, was re-elected vice president.

♦ ♦ ♦

Stephen E. Miller has been appointed sales representative in the northeastern Ohio territory of the Nock Fire Brick Co., Cleveland. Mr. Miller, who attended Western Reserve University, until recently was associated with Johnson Fire Brick Co., Cleveland, in the sale of refractories. Prior to that he spent 13 years as a melter in the openhearth and electric furnace departments, Jones & Laughlin Steel Corp., Pittsburgh.

♦ ♦ ♦

Joseph N. Moorhead has joined Electro Refractories & Alloys Corp., Buffalo, in a consulting capacity. Mr. Moorhead retired in July as works manager, Buffalo plant, American Magnesium Corp., Cleveland, subsidiary of Aluminum Co. of America.

♦ ♦ ♦

James B. Brown has been appointed secretary-treasurer, Welland Electric Steel Foundry Ltd., Welland, Ont. **M. Trotter** has been named chief metallurgist of the company.

♦ ♦ ♦

James P. Dixon has resigned as president, Benton Harbor Malleable Industries Inc., Benton Harbor, Mich., following 30 years of service with the company.

O. B. J. FRASER

LESTER C. FILL

GUSTAV LAUB

WARD A. MILLER

U.S. NAVY Casting Research

(*Continued from page* 91)

section or tubular form is cast, or in multiple casting where the castings are of small dimension in relation to the radial distance from the center. Such castings have relatively uniform pressure insofar as any argument for pressure is considered sound.

Creation of pressure by centrifugal force in a casting of appreciable dimension placed radially from the center has, of course, the greatest variation of pressure in one cavity that can be obtained. The pressure, aside from important considerations set forth, is unimportant to the casting, except in extremely small castings where pressure is needed to fill the mold. Such castings usually are gated wrong-end-to with the coldest metal running to the thinnest section farthest from the gate.

Mold Material Eroded

Damage created by erosion of mold materials is greatly reduced in centripetal casting, since eroded mold material being less than one-quarter the weight of the metal is pushed ahead of the metal as it advances toward the center, instead of moving against the stream of incoming metal. This is preferable to entrapping it in turbulent metal and hoping that eventually it will be separated from the quiescent metal of the filled mold and be pushed through the surface oxide and against the surface tension to the outside surface by centrifugal force acting upon weight differentials.

In most centrifugal casting practice higher pouring temperatures and speeds than necessary to run the mold are used so that the metal may remain fluid long enough for the hoped-for movement of foreign materials from the metal accelerated by centrifugal force.[5] Thus, shrinkages are intensified and larger grain sizes with greater grain size differentials are created.

In centripetal casting the coldest possible metal may be poured that will advance in a continuous column from the rim to the center against a decreasing surface area. In centrifugal casting a minimum quantity of metal entering the mold runs over the maximum mold area with the maximum of turbulence, chilling, shotting and erosion.

Centripetal Casting Turbine Rotors

—In most rotor and wheel forms the hub is thicker than the rim so that the hottest metal advances over the thinnest outer section toward the thick hub section. This has great inherent advantages. The hot metal liberates maximum heat to the mold due to the larger surface area of the thin section, thus preheating the mold and reducing the metal temperature as the metal advances to the thicker mold section with the lower surface-to-mass ratio. Consequently, the hot mold surface and the hot metal nearer the gate stay hot longer than would otherwise be possible. The coldest metal meeting the coldest mold surface in the thick section cools much faster than would otherwise be possible. This procedure tends to reduce greatly the temperature differentials, center line shrinkage, grain size differential, casting strains, and the stress of both pre and post solidification shrinkage.

Many Castings in Mold

Centrifugally casting a large number of small castings or small number of large castings in the same mold has met with decreasing approval as the casting weight increases and metal volume adds to the time, temperature and erosion of gating. The deficiencies of centrifugal casting are being increasingly understood.

Large molds create added difficulties due to the difficulty of multiple patterns, unorthodox gating, varying pressures and the well known problem of keeping large core molds flat, baking them uniformly and handling molds and core plates and keeping the plates flat. Added problems are the decrease in accuracy of molding machines in large size and of multiple matches and the multiplication of these problems incident to stacking.

In mold stacking special knowledge is required of fluid metal hydraulics and of the control of temperature, pressure and flow essential to accurate control of mold filling so that each successive vertical mold cavity is largely solidified before the next is filled. Otherwise, great cumulative ferrostatic pressures proportional to the total area of the fluid metals in all molds filled create distortion, fins, runouts and clamping problems in statically poured molds. These become complicated by radiation.

The foregoing enumerates some of the problems incident to a logical, complete and accurate evaluation of the centrifugal casting process and to the long and extensive research and development of the centripetal casting process. Included in considerations which project personnel undertook and evaluated were:

1. Mathematical considerations of principles of hydraulics applied to fluids moving at varying and rapidly accelerating speeds, varying pressures, temperatures, fluidities and surface tensions.
2. Evaluation of mold materials from sand through graphite to ceramics, including evaluation of heat transfer, particle size, permeability, wetting effects, heat shock resistance, etc., as well as bonding and methods of molding, pressing or machining to form.
3. Establishment of continuous temperature recording in the ladle.
4. Application of advanced heating methods to molds, to selected areas of molds and the control of solidification of castings in whole or in part and of the solidification of heads, gates, etc., by induction and dielectric means.
5. Consideration of mold atmospheres, evaluation of all disposable patterns from wax, through plastics to frozen mercury and other fluids.
6. Application of refrigeration.
7. Plastic phase heat treatment control.

Fig. 7 shows a sketch of the master casting machine built on the project for centrifugal and centripetal casting. It will mount a table from 3 to 10 feet in diameter, can handle a casting as large as a destroyer propeller, and has a capacity of 10,000 pounds. Uniform pouring temperatures and controlled cooling rate provide control of grain size. Drive is by a 20-hp full-torque motor giving variable speeds from 0 to 1500 rpm.

Metal can be cast under pressure or vacuum in any desired atmosphere. Molds, gates, heads, or any portion of the molds can be heated while rotating by induction or dielectric circuits. Induction heating capacity is 200 kw at 3000 cycles. The machine is designed to be equipped with brine cooling from a refrigeration unit partially installed. A hood over the machine and blower exhausting through the hollow 11-inch ID shaft will evacuate all smoke and gas from the hood to outside the foundry.

Fig. 4 shows a cross section of the trajectory pouring tube, this consisting essentially of a ceramic pouring basin and graphite shroud tube encasing a ceramic pouring tube of approximately 1⅛ inches ID. At the bottom of the latter is a ceramic spout cup with an orifice of ¼ to ⅜-inch diameter. The pouring tube is supported by a pouring rig which is raised hydraulically to perform pouring at a controlled rate. When the tube has been raised to a predetermined height as indicated on the mold

(*Concluded on page* 118)

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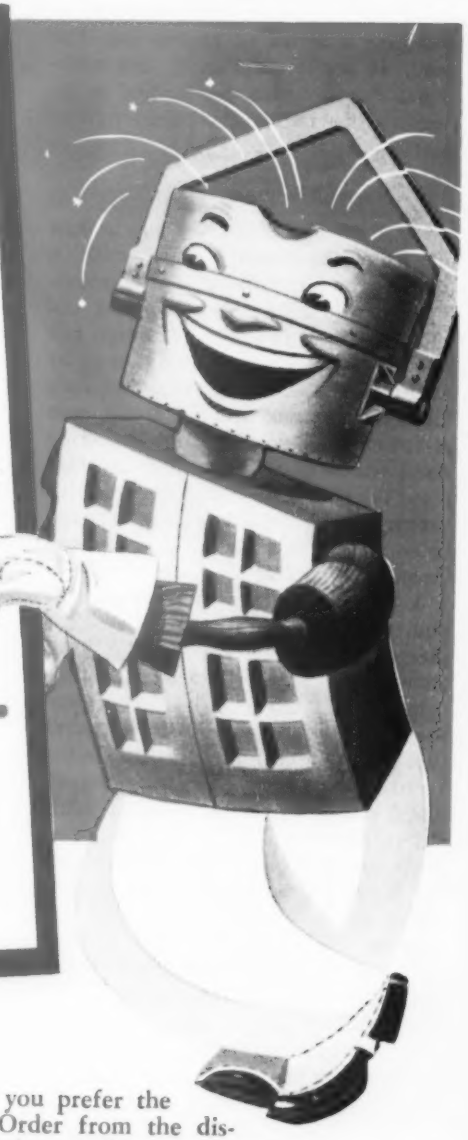

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(*Concluded from page* 116)

cavity profile standing at the right of the rigging, the tube is removed quickly and pouring is resumed direct into the head of the mold.

Pouring of a casting with the pouring basin and trajectory spout is shown in Fig. 5. With pouring completed, induction support is turned on to control solidification of the head. Solidification is checked by plunging a series of probes into the head, as shown is Fig. 6. An additional function of the probes is to keep the head from closing over from heat loss at the top.

Poured Through Small Hole

Fig. 8 shows the pouring cup broken off from the pouring tube with a hammer and the metal slug remaining as residue in the bottom of the cup level with the hole. Through the ⅜-inch diameter hole 340 pounds of metal was poured, yet cup and hole diameter remain intact. Metal was N-155 cobalt alloy. Through the same sized orifice 38-18 nickel-chrome alloy also is poured. With temperature ranging up to 2900° F, this is believed to be a most severe test of shock and erosion to ceramics.

A close-up of the metal meter or pouring controller, sketched above the master casting machine in Fig. 7, is shown in Fig. 9. Function of this equipment is three-fold: 1. To measure and record continuously temperature of molten metal in the ladle; 2. to weigh and record amount of metal poured; and 3. to record pouring rate. The device is suspended on the crane hook and in use supports the ladle. It mounts a dynamometer scale, clock and two pyrometer recorders, one recording six platinum-rhodium lance thermocouples intermittently immersed in the ladle, the other recording a new Rayotube radiation pyrometer with target tube immersed in the ladle. It also carries 32-volt direct-current batteries and 110-volt alternating current to drive the recorders, movie camera and cooling fan and to power four photo lamps. The camera records on movie film the weight of metal poured from the scale suspending the ladle against time shown on the clock.

Because grain size control, accurate control of shrinkage and erosion of mold material are dependent upon temperature control, improved pyrometry for reading and recording metal temperatures in the ladle is essential. One of the sub-projects undertaken in connection with the contract was the development of radiation target tubes to withstand continuous use for one heat of metal. Success attended this effort in development of the ceramic RP-10 tube No. 2, which is a tapered target tube having a hemispherical end and 3/16-inch wall section. This forms the target for a Leeds & Northrup Rayotube radiation pyrometer and is secured to the tube by a semiflexible metal coupling coated with special refractory cement at the slag line.

The target tube assembled on the Rayotube is preheated to 2600°F in the electric Globar heater shown as item No. 3 in Fig. 1 (THE FOUNDRY, November). Following preheating, the target tube assembly is attached to the ladle with the target tube immersed and the Rayotube connected to the recorder in the metal meter beneath which the ladle is suspended. This is shown in Fig. 11. Slag always has fouled immersion units, but short life of the unit has minimized this problem. The slag problem multiplies with successive use of longer life tubes. A lime and ceramic coating was developed which dissolves slowly, fluxing the slag and keeping the tube practically free from slag interference.

Sand Bonded With Plastic

Fig. 10 shows the assembly of corebox patterns for casting a bladed and shrouded steam turbine rotor, designated as "M." The core is made in a special liquid plastic bonded sand with ceramic facing. The ceramic segments "F," which form the precision cast blades requiring no machining, are located by 158 radial pins inserted between outer ring "C" and middle ring "D" for alignment, and hold blades between middle ring "D" and inner ring "G," all of these rings being locked by part "B." "A" is a gate core with ceramic distributor cup in center. "H" is aluminum facing which mounts on print on "B" and forms face of wheel. "K" and "L" are ring and disk coreboxes, respectively. Pins "J" are vertical ingates at rim of wheel for centripetal casting.

Fig. 14 is the corebox and Fig. 15 the ring core for the 79-blade shrouded steam turbine rotor for preliminary studies of gating, metal flow, shrinkage, etc. This wheel was cast originally first in sand and then in ceramic cores. The ring core forms the 79 buckets or blades of the turbine wheel. Metal section of the buckets range from 1/32-inch at the edges to 5/16-inch in the center. Blades form a 16-inch circle cast integral in the shrouded wheel. No risers were employed.

The 79-blade centripetally cast shrouded steam turbine rotor as it leaves the mold is shown in Fig. 16. The cast rotor rough machined is shown in Fig. 17. Blade edges clean up and the shroud section is reduced in finished machining. By way of contrast, the fabricated rotor in which blades are individually milled from solid metal and shroud, is composed of interlocking segments riveted to projections from blades. This is a very costly rotor and shrouds sometimes fail. As pointed out previously, the Navy research goal was development of the one-piece cast rotor as an improvement on and simplification over the fabricated rotor.

A sketch of the graphite mold with induction heated head for the gas turbine rotor is shown in Fig. 12. Cope of the mold with ceramic pouring tube is shown in Fig. 19. Method of pouring the mold centrifugally with use of the trajectory nozzle is illustrated in Fig. 13. The casting being removed from the graphite mold is shown in Fig. 18, while Fig. 20 shows the ceramic sleeve being removed from the head with the graphite collar—part of the cope—remaining. Fig. 21 shows the rough casting. It should be noted that height of head is made necessary to put the induction coil far enough above the graphite mold to prevent local heating of mold by stray inductive currents from the coil.

Fig. 23 shows a slab cut through the center line of a 340-pound, gas turbine rotor disk. The alloy is N-155 containing equal percentages of nickel, chromium and cobalt, approximately 21 to 23 per cent each. It will be noted that the structure is extremely good; it is uniform, relatively even and well centered. Sufficient chill has been imparted to attain a columnar rim of fine proportions which tapers into a fine equiaxed grain in the hub of the wheel. Fig. 22 shows one half of a center line slab cut from a similar rotor cast in 38 Ni-18 Cr.

Obtain Fine Grain

Of considerable metallurgical significance is the fact that in the gas turbine rotor disk there has been obtained for the first time in a large casting a very fine grained center with slight difference between the center of a section on which can be drawn a 7-inch circle and the smaller section approximately 2 inches thick. This is because for the first time in casting ferrous alloys it has been possible to control the Btu input accurately by utilizing the metal meter for measurement and a controlled orifice for the trajectory spout, permitting a definitely controlled rate of the Btu entrance into the mold, as well as the Btu transfer from the mold.

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NATIONAL FOUNDRY ASSOCIATION MEETS

(*Continued from page 99*)

and problems affecting his business and the community, he sends out at intervals a questionnaire of 25 questions to their homes. Any employee answering 15 or more of these questions gets $2.50. The employer does not require agreement with his views. He just wants at least 15 questions answered. This, Mr. Roark observed, is thought-provoking and is really a "grass roots" operation.

The only way to stop the trend toward statism is through election of candidates to Congress who stand firmly for constitutional government, regardless of their political affiliation, said H. Velde, Illinois Republican member of Congress.

He warned that the group of Republicans and conservative Democrats in the 81st Congress, whose "purpose was to throw out the evils of Communism, Socialism, and the Welfare State," cannot "hold our fort" forever and must be buttressed by those who "place principle above politics in their thoughts and actions, and give unstintingly of their time and energy to fight the cold war against this creeping paralysis of socialism."

Need Political Action

The approach to the "welfare state" had its beginnings in the NRA, the speaker said. Following, he pointed out, were the "packing the Supreme Court with men willing to obey the dictates of President Roosevelt, through abdication of the independence of the Federal Judiciary to the Executive Branch"; oppressive taxation; bureaucratic control; and what now "might be considered a 5-year plan of President Truman's to educate and train citizens to the ways of socialism."

Dr. Leo Woldman, director, National Bureau of Economic Research, gave an interesting talk at the Thursday luncheon on "Economics as It Affects Government, Labor and Industry." Dr. Woldman discussed increased government intervention in the affairs of all its citizens and indicated, as a direct result, the budget is increased and taxes grow. Indirect consequences include an increase in the cost of doing business, impairment of power of management which has been a fundamental strength of this country, and the dissemination of misleading information on what people are going to get from the government.

Industry must stop talking to itself and bring the message of advantages of free enterprise to employees and the man in the street, declared Stevens H. Hammond, president, Whiting Corp., Harvey, Ill. In this task industry is at immediate disadvantage with a late start in overcoming contrary progress made by union and political leaders.

Mr. Hammond stressed importance

HARRY E. LADWIG
President

of conducting better human relations at local levels with top executives spearheading the movement. Trend in industry toward super-conservatism should be halted with co-operative efforts directed toward improved relationship with newspapers, radio and other public agencies. Mr. Hammond outlined in detail suggested program for better relations at local

A. V. MARTENS
Vice President

levels sponsored by the Illinois Manufacturers' Association. This includes importance of individual companies economically to the community, distribution of its products and intimate facts connected with the business affecting employes and and all other classes of citizens.

Why, he asked, are news announcements and press releases usually available first from union leaders and politicians; he answered by stating they were available and co-operative. Often industry delays with its statement and interpretation until it is no longer news. Union and political leaders talk direct to their prospects.

To avoid a crisis, Mr. Hammond also declared that management and labor must work together, adding:

"To face the crisis ahead, our country needs teamwork more than ever before. Management and labor must find a way to work together. Under political prodding, they have been divided by selfishness and greed. Now industry must put its best foot forward to bring them together.

"If this is not done soon, we will find ourselves in a decadent socialist state like England. The job is not one that can be left to someone else or to any trade association. Everyone connected with management must take part and the greatest emphasis should be put at the local level".

Industry Needs Instruction

Direct instruction in the art of supervision is an immediate need of industry, if proper control of the performance of employees including safe working habits is achieved, according to H. W. Heinrich, Assistant Superintendent of the Engineering and Inspection Division, Travelers Insurance Co., Hartford, Conn.

To make sure the supervisor acts correctly, Mr. Heinrich proposed a formula. The first step is the identification of work, procedure, attitude, and personal problems. Once identification has been made, the supervisor should try to discover reasons for the existence of a problem. The speaker enumerated these reasons as "lack of skill, misunderstanding, indecision, awkwardness, standard procedure, inadequate or unsafe space, lighting, tools, etc., and unsuitability of physical and personal characteristics." The supervisor then selects from the following four remedies—engineering revision, persuasion and appeal, personnel adjustment, and discipline—and finally applies the remedy.

Manifesting his sympathy with businessmen in many of their problems, Lowell B. Mason, Federal Trade Commission, Washington, said that he believes "every branch of government should justify itself in the eyes of business, or go out of business itself."

But, he emphasized, businessmen

(*Concluded on page 122*)

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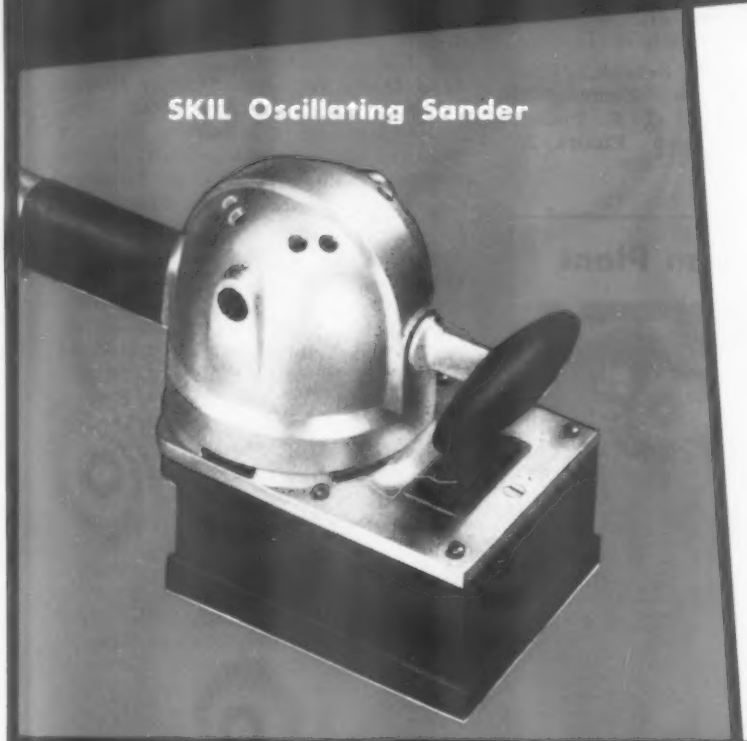

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SKIL Belt Sanders provide highest sanding speed (10 times faster than by hand) yet give flat surfaces a hand sanded finish. Ideal for preparing surfaces for painting, varnishing or lacquering. Makes quick easy work of removing old finishes.

(*Concluded from page* 120)

owe it to themselves and to the government to make their positions and needs known to Washington. The old adage is true, he said, most business men "know how to meet a payroll, but not a Senator." He urged them to get in touch and keep in touch with legislative activities.

An interesting speaker was Frederic Snyder, journalist, who spoke on the subject "There will be a Tomorrow."

The association passed four resolutions: (1) Urging members to request Congress to amend and strengthen the Taft-Hartley Act so that nationwide or industrywide bargaining, be banned; (2) encouraging members to keep their congressmen adequately informed of the needs of the foundry "in a competitive free enterprise economy without, at the same time, asking the government for special favors at any time." (3) Urging members to conduct in-plant educational programs designed specifically to enlighten employees in every detail of Labor-Management Act of 1947; and (4) Urging members "to accumulate every fact they can pertaining to the subject (pension plans and other employee benefits), anticipate possible increased deferred or future costs, analyze any added benefits as cost factors in producing castings in the light of continued heavy competition and to predicate any decisions on the situation in their own companies without recognizing so-called national patterns which organized labor may claim to be developing in the installation of such plans."

District committees of the association for the coming year are as follows:

First—H. A. Davis, Fremont Casting Co., Worcester, Mass., chairman; B. J. Barrell, Grinnell Corp., Cranston, R. I., vice chairman; Frank Chaffee, Patch Wagner Co. Inc., Rutland, Vt.; Arthur Enquist, Connecticut Foundry Co., Rocky Hill, Conn.; Lorenzo Fairbrother Jr., Universal Winding Co., Providence, R. I.

Second — John F. Schenk, Foran Foundry & Mfg. Co., Flemington, N. J., chairman; R. C. S. Potter, Chemung Foundry Corp., Elmira, N. Y., vice chairman; G. W. Hannay, Barnett Foundry & Machine Co., Irvington, N. J.; W. H. Cole, Moore Bros. Co., Elizabeth, N. J.; Charles E. Blumenaur, Albany Castings Co. Inc., Voorheesville, N. Y.

Third—J. R. Berg, Mesta Machine Co., Pittsburgh, chairman; Charles A. Jurgensen, DeLaval Steam Turbine Co., Trenton, N. J., vice chairman; George A. Taylor, Bethlehem Foundry & Machine Co., Bethlehem, Pa.; M. G. Moore Jr., Empire Steel Castings Co., Reading, Pa.; Robert W. Frank, Lewis Foundry & Machine Division, Blaw-Knox Co., Pittsburgh.

Fourth—Earle N. Reynolds, Detroit Brass & Malleable Works, Detroit, chairman; John M. Price, Ferro Machine & Foundry Inc., Cleveland, vice chairman; Lewis N. Essex, Golden Foundry Co., Columbus, Ind.; R. J. Redmond, Buckeye Foundry Co., Cincinnati; M. W. Manz, Ohio Brass Co., Mansfield, O.

Fifth—William H. Muchnic, Locomotive Finished Material Co., Atchison, Kans., chairman; Gust Olson Jr., John Deere Waterloo Tractor Works of Deere Mfg. Co., Waterloo, Iowa, vice chairman; O. N. Green, Newton Foundry Co., Newton, Iowa; R. D. Phelps, Francis & Nygren Foundry Co., Chicago; B. D. Beard, Chambers-Bering-Quinlan Co., Decatur, Ill.

Sixth — A. L. McKay, Kaukauna Machine Corp., Kaukauna, Wis., chairman; L. R. Clausen, J. I. Case Co., Racine, Wis., vice chairman; G. E. Tisdale, Zenith Foundry Co., West Allis, Wis.; Arthur R. Janes, Standard Foundry Co., Racine; J. J. Ewens, Grede Foundries Inc., Milwaukee.

Seventh — E. P. Trout, Lufkin Foundry & Machine Co., Lufkin, Tex., chairman; J. S. Bridges, United States Pipe & Foundry Co., Bessemer, Ala., vice chairman; H. A. McLellan, Grinnell Corp., Atlanta; J. D. Capron, Glamorgan Pipe & Foundry Co., Lynchburg, Va.; Paul L. Arnold, United States Pipe & Foundry Co., Chattanooga, Tenn.

French Foundry Team Visits American Plant

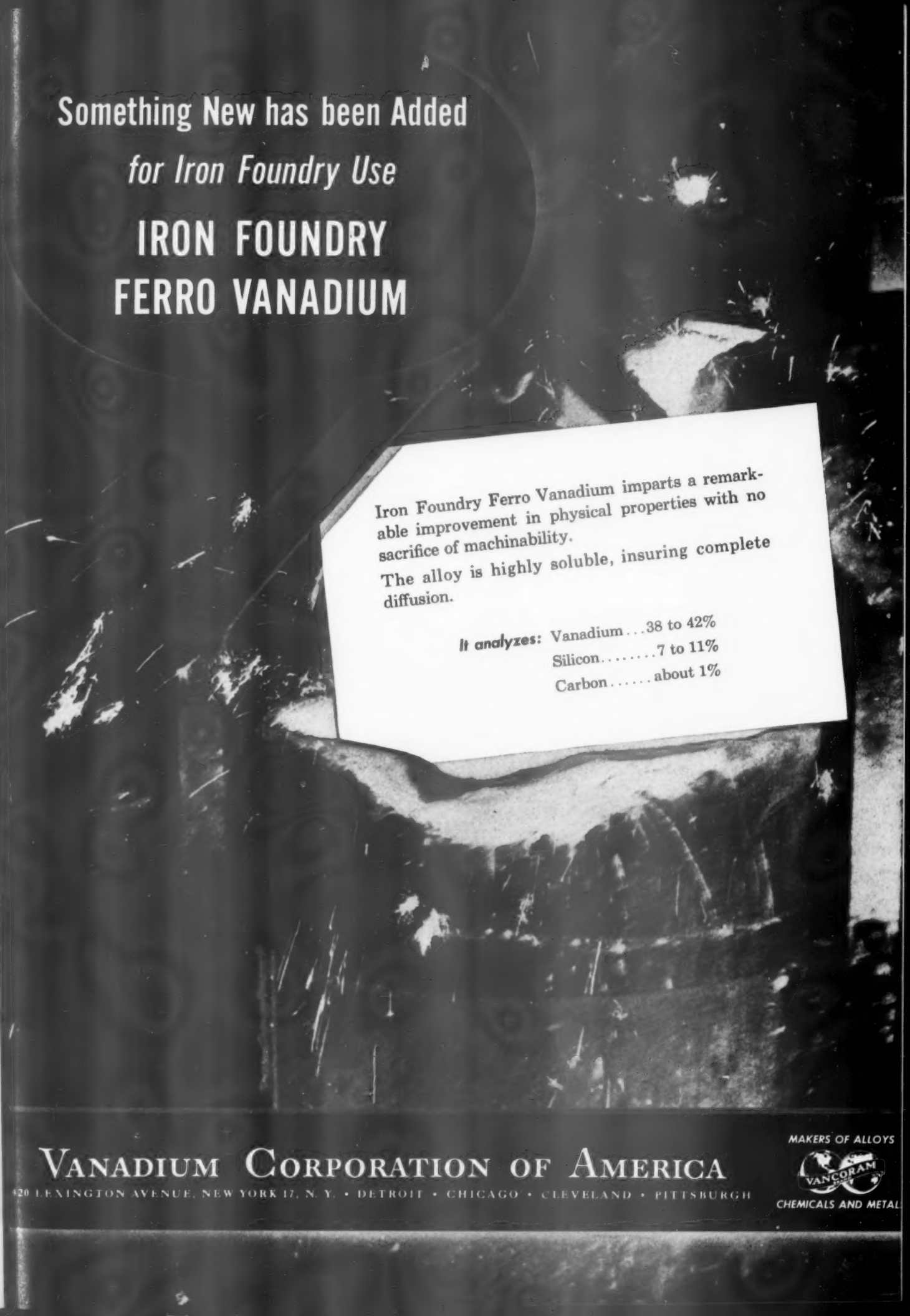
EIGHTEEN members of a French foundry group touring American foundries observing production methods as guests of the Economic Co-operative Administration of Washington, recently visited the Chicago Hardware Foundry Co., North Chicago, Ill. The visitors are attempting to gain technical knowledge of molding and metals, standardization and quality improvement, modernizing equipment and training of employees. Special attention was given to cupola control, melting and pouring.

The group, conducted by Charles W. Kerwood, ECA, and headed by Paul Chatelin, Technical Administration of French Foundries, was accompanied on the tour by E. B. Sherwin, company president.

Shown above, front row, left is F. J. Sherwin, vice president of Chicago Hardware; third from left is Mr. Chatelin; man in trench coat is E. B. Sherwin; extreme right is Frank Meade, works manager, Chicago Hardware; extreme left, second row is Mr. Kerwood. Others in the picture are members of the visiting French group.

Offers Guide on Sling Chain Use

McKay Co., 326 McKay Bldg., Pittsburgh 22, has issued a wall chart which facilitates selection of sling chains for every requirement and provides a permanent record of performance for specific chains used in shops and factories. Data on alloy and iron chains and the working load limits of sling chains in 9/32 to 1-in. sizes are shown, as are weights of loads that can be lifted when a given sling is used at angles of lift from 1 to 90 degrees. Chain Institute Inc. definitions, instructions and cautions governing the use of sling chains are included.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CASTING

A NUMBER of casting producers and foundry technical societies exhibited their products at the National Metal Congress & Exposition, held in Cleveland, Oct. 17 to 21. Some of the booths are pictured here: Fig. 1—Austenal Laboratories Inc., Microcast Division, New York; Fig. 2—Fulton Foundry & Machine Co., Cleveland; Fig. 3—Precision Metalsmiths Inc., Cleveland; Fig. 4—Gray Iron Founders' Society, Cleveland; Fig. 5—Superior Foundry Inc., Cleveland; Fig. 6—Standard Alloy Co., Cleveland; Fig. 7—Wellman Bronze & Aluminum Co., Cleveland, and Fig. 8—Howard Foundry Co., Chicago.

Other foundry exhibitors included: Alloy Engineering & Casting Co., Champaign, Ill.; American Brake Shoe Co., Engineered Castings Division, New York; Arwood Precision Casting Corp., Brooklyn, N. Y.; Forest City Foundries Co.; Cleveland; Haynes-Stellite Co., Kokomo, Ind.; Lake City Malleable Co., Cleveland; Malleable Founders' Society, Cleveland; Aurora Metal Co., Aurora, Ill.; Monarch Aluminum Mfg. Co., Cleveland; Dow Chemical Co., Midland, Mich.; American Non-Gran Bronze Co., Berwyn, Pa.; National Bronze & Aluminum Foundry Co., Cleveland, and General Alloys Co., Boston.

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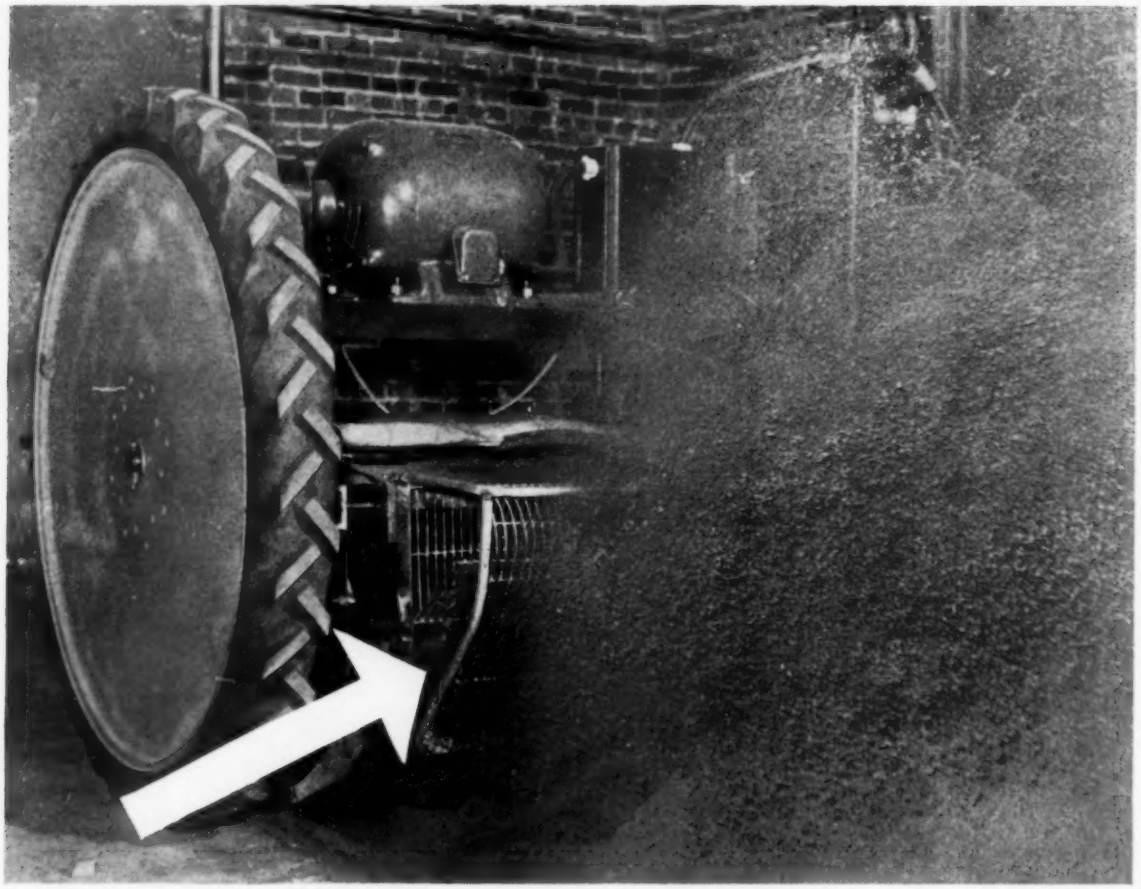


"The Moulders' Friend" **Screens Your Sand Heaps.** In the illustration, the control apron has been removed to show the action of the rotary wire bristle brush as it atomizes the sand and throws it through the screen depositing the tramp iron and trash in the tray. The brush does the job.

"The Moulders' Friend" **Fits Your Foundry.** Carried on two large pneumatic tired wheels, it rolls easy and turns short in the crowded foundry under the complete control of one man—No experience required to operate—Saves labor shoveling.

"The Moulders' Friend" **Improves the Condition of Your Sand Heaps.** The brush does the job. Thousands of flat tempered steel wires in the brush revolving at high speed pick up small particles of the used sand, added bond and moisture and blend them thoroughly. The action is so thorough that clay bond and water can be blended with the sand in one trip over the heap.

"The Moulders' Friend" **conditions *all* the heap.** As it travels over the heap it gathers *all* of the sand from the floor, pulverizes the lumps and blends it thoroughly, avoiding the layer of dry, unconditioned sand sometimes found next to the foundry floor.

"The Moulders' Friend" **Is Easy to Buy and Maintain.** Simplicity of construction with few moving parts keeps down original and replacement costs. High speed chain drives run in dirt proof, oil tight cases.

Investigate this remarkable machine. Your neighbor has one. If you want satisfied moulders making quality castings write us now.

"The Moulders' Friend", **Dallas City, Ill.**

NONFERROUS GROUP ANNUAL MEETING

(*Concluded from page* 92)

plates and loose patterns, proper inclusion of fringe costs, effect of using average cost per pound in estimating cleaning costs, and budgeting sales and production.

Report of the Aluminum Committee, headed by Louis Fischer, Fischer Casting Co., Plainfield, N. J., covered its activities since a year ago when stringency in aluminum ingot supply prompted the society to seek the purchase of a government-owned aluminum reduction plant. It was indicated that changed market conditions have made it inadvisable to proceed further with this plan.

Evidence of a moderate pickup in business in a number of sections of the country during early fall was disclosed in brief summaries of market conditions by various members.

Assist Small Business

Plans to assist business, particularly small business, are being extended to their roles in a national emergency, the society was told by Lt. Col. Frank H. Holmes, Munitions Board, Washington, who discussed "Industrial Mobilization and the Munitions Board." Colonel Holmes explained roles of the agencies identified with the security program, pointing out that the National Security Resources Board is concerned with the overall co-ordination of military, industrial and civilian phases of industrial mobilization, while the Munitions Board of the Secretary of Defense is concerned primarily with the military aspects of industrial mobilization.

In its task the Munitions Board relies heavily on its industry advisory committee organization to keep mobilization planning geared to current production methods, he added. At present these advisory committees and subcommittees comprise approximately 600 industrial leaders. The Foundry Industry Advisory Committee, organized in 1948, has nine subcommittees covering individual segments of the industry and one overall technical subcommittee.

The speaker outlined procedures being followed in co-operation with industry in determining and stockpiling strategic and critical materials. One task, scheduled for completion in 1952, is the incorporation into a single supply catalog system of millions of items used by the Department of Defense. Each item used by the services will then be identified under one name assigned only one identification number, and description will be placed in a single commodity classification. This catalog will replace the 17 different systems now in use. Duplication of procurement will be eliminated, and a corresponding reduction in storage space required will be obtained.

Standardization of many types of equipment, specifications and engineering design also is now being studied, and substantial progress has been made in a number of fields. Another move to facilitate procurement is the establishment within the Munitions Board of a Military Procurement Information Center. This office, staffed by specialists from the Army, Navy and Air Force, will assist seekers of contracts from the armed forces in reaching the proper party for contract details, thereby eliminating the need for middlemen in obtaining such information.

In conclusion, Colonel Holmes cited the need for the sort of planning that will provide the maximum security without either militarizing the nation or bankrupting our national economy.

An interesting description of steps taken by nonferrous foundries of Los Angeles in helping to combat the smog problem there was presented by A. L. Goodreau, G-B Brass & Aluminum Foundry Inc., Los Angeles. Mr. Goodreau, a director of the society and chairman of the Nonferrous Smog Committee of Los Angeles, supplemented his remarks with a color motion picture prepared by his committee to illustrate the facilities and practices adopted to restrict emissions to the atmosphere during melting and pouring. (For additional details on this subject, see "How To Control Fumes in Noferrous Melting," THE FOUNDRY, September, 1949, p. 118.)

The meeting participants were welcomed to the annual dinner by E. T. Korten, Reliable Castings Co., Cincinnati, chairman of the Cincinnati Chapter. Following introduction of the new officers for 1949-50, an entertaining talk entitled "A Parson Takes a Gander" was presented by Dr. William Dern, Newport, Ky.

Committees of the Non-Ferrous Founders' Society for the coming year have been appointed as follows: Cost —William A. Gluntz, Gluntz Brass & Aluminum Foundry Co., chairman; E. J. Metzger, Wellman Bronze & Aluminum Co., Cleveland; C. E. Piper, Erie Bronze Co. Membership — J. D. Zaiser, Ampco Metal Inc., and all directors. Labor Relations—George B. Hazen, Brass Foundry Co., Peoria, Ill., chairman. Chapter Activities—Fred Haack Jr., Capital Brass & Aluminum Foundry Co., chairman. Trade Practices—L. H. Durdin, Dixie Bronze Co. Inc., chairman; J. D. Zaiser; A. L. Goodreau, G-B Brass & Aluminum Foundry Co.; W. B. Wilkins, American Manganese Bronze Co.; William E. Paulson, Thomas Paulson & Son Inc.

Centrifugal Casting

(*Concluded from page* 97)

phosphorus compounds to wet and build up on graphite mold surfaces. This sometimes makes extraction of castings from the mold more difficult but is not a serious factor if sufficient draft on mold surfaces is allowed. The usual draft is 3/16-in. per ft.

Typical nonferrous castings poured centrifugally are shown in Fig. 6. As the metal is dense and comparatively free from porosity, physical properties are high. These considerations sometimes permit using lower factors of safety in design. High yield and excellent quality of centrifugal castings make them economical.

Speakers' table at annual dinner of the Non-Ferrous Founders' Society includes, left to right: L. H. Durdin, second vice president; E. T. Korten, Cincinnati Chapter Chairman; Fred Haack Jr., outgoing president; Walter M. Clark, president; J. D. Zaiser, first vice president

By EDWIN BREMER

FOUNDRY Developments

ADDITION of magnesium to a ferrous alloy which results in the retention of at least a critical amount of magnesium in the final product to provide a microstructure in which the uncombined carbon is in the form of soft, gray-colored spheroids is disclosed in U.S. Patent No. 2,485,760. Granted to Millis, Gagnebin and Pilling, and assigned to International Nickel Co. Inc., New York, it mentions that a particularly responsive range of compositions of the ferrous alloy is defined by the carbon limits of 2.5 to 4.5 per cent, and the silicon limits of 1 to 4 per cent, with the silicon content being so related to the carbon content that the sum of the silicon percentage divided by 3.1 plus the carbon percentage divided by 4.5, is greater than 1.00.

Manganese is preferred not to exceed 0.8 to 1 per cent, and higher ductility and toughness are secured when that element does not exceed 0.3 per cent. Phosphorus content may be as high as 0.5 per cent or more, but preferably should not be more than 0.15 per cent, and where high impact and ductility are desired, the phosphorus should not be over 0.06 per cent. Sulphur content is low, usually not exceeding about 0.02 per cent. As far as sulphur is concerned, the patent mentions that in practice one part by weight of magnesium is introduced for each part by weight of sulphur to be removed.

Amount of magnesium retained in the product to produce a microstructure wherein the uncombined carbon all is present in form of spheroids is indicated to be 0.04 to 0.3 per cent. The patent cites some 26 magnesium bearing alloys which can be employed to introduce magnesium into the molten bath. These include nickel-magnesium, nickel-magnesium-carbon, nickel-silicon-magnesium, nickel-iron-magnesium-carbon, nickel-iron-silicon-magnesium, silicon-iron-magnesium, silicon-manganese-magnesium, copper-manganese-magnesium, and copper-magnesium. Inoculation of the molten bath after addition of the magnesium with silicon bearing alloys is indicated also.

FURTHER disclosure on magnesium additions to gray iron is presented in U.S. Patent No. 2,485,761 granted to Millis, Gagnebin and Pilling and assigned to International Nickel Co. Inc., and is concerned with the improvement in founding properties as well as mechanical and physical properties. According to the patent, this is accomplished by magnesium additions which result in 0.02 to 0.04 per cent retained magnesium in the iron. Effect is to provide a microstructure wherein the graphite appears in the form of compacted flakes, shorter and thicker than the flakes occurring in gray irons of similar composition, but magnesium free. Preferred ferrous composition is given as 2.5 to 3.2 per cent TC, 1.6 to 2.5 per cent Si, 0.02 to 0.04 per cent Mg, 0 to 3 per cent Ni, 0.4 to 0.9 per cent Mn. The properties are indicated as 0.15 to 0.20-in. deflection, and transverse load 4500 to 7500 lb, tensile strength 45,000 to 75,000 psi, bhn 200 to 300, and impact resistance 35 to 65 ft lb.

* * *

EMPTYING finely divided materials from bags usually is accompanied by considerable dusting. However, that undesirable feature can be reduced up to 75 per cent by a simple method, according to L. M. Merritt in *National Safety Council News Letter*. All that is required is to puncture the bag at the end opposite to that from which the material will flow. This permits the entrance of air where a vacuum ordinarily would be formed, and allows the material in the bag to flow out easily and smoothly.

* * *

AVAILABLE now from the Office of Technical Service, Department of Commerce, Washington 25, is a 48-page manual entitled *The Electron Microscope and Its Application to Materials Problems*, a basic introduction to the nature of the electron microscope and its contribution to various types of materials problems. In addition to a theoretical discussion of the problem of image resolution, the manual provides practical information on the construction and operation of the electron microscope, and the preparation of replicas and specimens. Typical applications of the electron microscope to the examination of finely divided materials and aggregates and to the inspection of surface details of metals, ceramics and finishes are discussed. Copies of the manual, designated PB 97957, may be obtained for $1.25.

* * *

REFERRING to the use of asbestos in core sand, a South African foundryman in the *Engineer and Foundryman* (Johannesburg, S.A.) points out that powdered vermiculite has been found to serve many applications in the nonferrous foundry. It is used as a mold, core and chill wash as well as a riser compound. A vermiculite wash sprayed onto metal gauze or screen forms a good filter, and the gates and risers where the screen is used can be knocked off. The material also may be mixed with molding or core sand to change its expansion and contraction characteristics. Addition of fine vermiculite to synthetic green sand is said to reduce drying out.

* * *

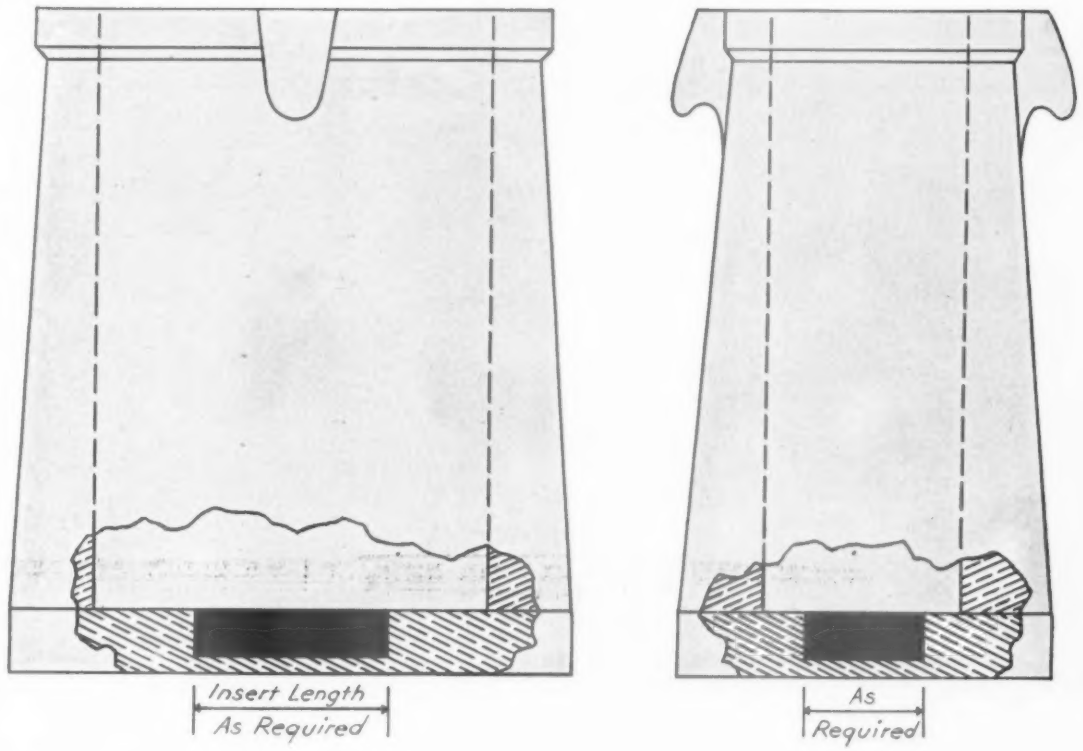
BANDING or difference in crystal structure accompanied by microshrinkage in certain types of centrifugally-poured steel castings is attributed to improper speed of rotation, and can be controlled. In one instance in the casting of gun tubes 12 ft long with the breech 12¾ in. in diam with a 1-in. bore as poured in a metal mold, the speed was changed from 750 rpm at the beginning of pouring to 1250 rpm in 3.75 minutes. Amount of steel poured in the mold was 2580 lb.

* * *

RECENTLY developed casting process is claimed to cast, mold, forge and coin the product to the finished state and eliminate 60 to 70 per cent of the machining operations normally required on a casting application. Applicable to aluminum, steel, brass, bronze and copper, the castings have consistent physical properties, density, and hard smooth surfaces. It also is said that tolerances of 0.001 to 0.002-in. can be maintained.

NO MORE STICKERS!

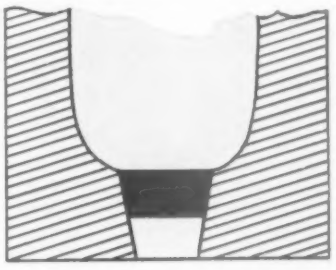
...when you use "NATIONAL" graphite stool inserts!



Use "National" graphite stool inserts in your open-bottom molds and you *eliminate stickers completely and forever!* Other advantages of graphite stool inserts are:

- They increase stool life by a wide margin
- Fewer stools are required — lower foundry costs
- They resist erosive action of falling molten metal

For more information on "National" graphite stool inserts, write to National Carbon Company, Inc., Dept. FO.



The term "National" is a registered trade-mark of
NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N. Y.
Division Sales Offices:
Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

If you use plug-bottom molds, "National" carbon mold plugs save dollars. They last longer . . . weigh less . . . are truer to shape . . . won't stick, spall, or contaminate the ingot. Write us for complete details.

THESE PRODUCTS SOLD IN CANADA BY CANADIAN NATIONAL CARBON COMPANY LTD., TORONTO 4, CANADA

FOUNDRY Statistics

Ingot Brass and Bronze

(Shipments in net tons)

	1949	1948
Feb.	15,026	22,487
Mar.	14,550	24,282
Apr.	10,695	25,177
May	11,114	23,716
June	9,696	24,401
July	10,220	20,456
Aug.	14,194	24,098
Sept.	16,208	23,641

Source: Ingot Brass and Bronze Industry.

Foundry Production Workers

ESTIMATED NUMBER:

Type Foundry	July 1949	June 1949	Aug. 1948
Iron & Steel	175,700	184,100	225,800
Nonferrous	58,400	59,400	71,100

AVERAGE WEEKLY EARNINGS:

Gray Iron	$53.11	$52.85	$57.88
Malleable Iron	52.56	53.70	58.97
Steel	55.91	54.88	61.21
Nonferrous	60.60	60.06	60.70

AVERAGE WEEKLY HOURS:

Gray Iron	36.6	36.5	40.7
Malleable Iron	34.9	35.4	39.9
Steel	37.1	36.2	41.3
Nonferrous	38.7	38.5	39.8

LABOR TURNOVER RATE (JULY)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	2.5	4.5	1.5	2.6
Malleable Iron	2.0	3.1	0.7	1.9
Steel	1.5	5.8	0.6	5.0

Source: Bureau of Labor Statistics.

Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1948	1949
Jan.	380.9	149.9
Feb.	367.3	144.4
Mar.	326.2	190.8
Apr.	412.0	172.0
May	388.5	121.9
June	376.8	164.9
July	456.3	146.6
Aug.	324.7	127.1
Sept.	273.5	166.6
Oct.	296.0	....
Nov.	284.4	....
Dec.	243.7	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Shipments of Castings

(Reported by Bureau of the Census)

Gray Iron

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	12,540,960	7,181,299	.....
1948			
June	1,072,040	597,624	2,587,081
July	914,464	490,359	2,601,084
Aug.	1,050,948	597,678	2,598,789
Sept.	1,088,051	615,978	2,587,385
Oct.	1,148,422	642,485	2,522,831
Nov.	1,099,827	606,380	2,406,737
Dec.	1,110,512	624,739	2,284,348
Total	12,785,909	7,131,405	.....
1949			
Jan.	1,040,343	573,164	2,064,861
Feb.	986,591	535,163	1,857,403
Mar.	1,074,704	567,041	1,639,465
Apr.	929,307	467,433	1,445,532
May	866,631	439,420	1,243,266
June	905,573	455,442	1,086,989
July	696,915	341,657	1,031,963
Aug.	872,013	445,981	1,048,308

Steel

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	1,625,055	1,203,504	.....
1948			
June	152,894	117,794	469,973
July	120,445	87,927	497,410
Aug.	140,223	107,538	472,481
Sept.	149,222	112,551	447,972
Oct.	152,983	114,819	424,460
Nov.	146,835	110,275	395,013
Dec.	157,395	116,285	354,458
Total	1,760,032	1,335,295	.....
1949			
Jan.	140,577	103,503	338,889
Feb.	135,042	99,425	320,202
Mar.	138,889	102,027	284,754
Apr.	119,953	83,277	250,506
May	106,178	75,537	191,473
June	116,052	84,112	173,237
July	78,710	50,124	155,494
Aug.	89,964	59,412	143,566

Malleable

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	895,054	513,228	.....
1948			
June	81,747	48,170	178,760
July	64,995	35,018	180,421
Aug.	73,272	41,201	176,824
Sept.	77,815	43,985	164,002
Oct.	81,761	44,306	158,351
Nov.	77,194	42,241	146,422
Dec.	79,882	43,397	137,385
Total	933,265	525,212	.....
1949			
Jan.	71,876	38,040	126,393
Feb.	66,744	35,074	118,318
Mar.	72,052	38,143	102,379
Apr.	61,329	31,728	94,958
May	54,572	27,643	78,944
June	59,597	32,639	69,865
July	44,360	23,216	70,796
Aug.	58,121	30,327	61,330

Aluminum

(Thousands of pounds)

	Shipments Total	Sand	Perm. Mold	Die	Unfilled *Orders
1947					
Total	441,996	155,112	174,515	110,538	.....
1948					
June	35,822	12,296	13,239	9,843	72,930
July	28,944	9,851	10,504	8,005	70,321
Aug.	32,136	9,883	13,174	8,526	68,334
Sept.	35,877	11,822	13,353	10,218	66,773
Oct.	35,542	11,733	13,216	10,158	65,538
Nov.	34,550	11,410	13,012	9,640	63,767
Dec.	31,836	10,335	11,589	9,290	59,154
Total	424,490	139,781	161,334	118,738	.....
1949					
Jan.	29,142	9,702	10,386	8,490	55,580
Feb.	27,228	9,286	9,339	7,795	52,916
Mar.	27,478	9,348	9,386	7,999	50,508
Apr.	23,801	8,041	8,353	6,876	45,638
May	21,392	7,582	7,293	5,994	41,460
June	23,261	8,668	7,790	6,257	38,159
July	18,621	6,311	6,592	5,180	36,993
Aug.	23,997	9,048	8,326	6,119	38,130

Magnesium

(Thousands of pounds)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	7,693	7,050	....
1948			
June	709	624	2,712
July	554	521	2,684
Aug.	703	655	2,834
Sept.	745	700	3,206
Oct.	708	650	3,070
Nov.	728	683	3,416
Dec.	754	695	3,455
Total	8,214	7,488	....
1949			
Jan.	822	761	3,821
Feb.	813	756	3,586
Mar.	879	800	3,227
Apr.	726	669	3,234
May	778	726	2,885
June	799	759	3,025
July	689	637	3,073
Aug.	753	712	3,107

Copper-base Alloys

(Thousands of pounds)

	Shipments Total	Sand	Perm. Mold	Unfilled *Orders
1947				
Total	1,051,742	960,732	51,139	.....
1948				
June	84,817	76,241	5,148	64,149
July	71,803	64,389	4,670	66,014
Aug.	81,976	73,947	5,018	69,126
Sept.	86,973	78,830	4,999	66,574
Oct.	91,311	82,463	5,293	62,571
Nov.	86,497	77,751	5,107	60,892
Dec.	88,182	79,750	4,796	53,671
Total	1,030,825	930,790	59,009	.....
1949				
Jan.	76,348	68,379	4,593	48,124
Feb.	68,776	61,278	3,951	40,517
Mar.	70,173	62,557	3,927	37,646
Apr.	59,573	52,837	3,458	32,746
May	53,699	48,004	2,830	30,926
June	52,616	47,678	2,552	26,786
July	43,273	39,372	2,129	26,013
Aug.	58,055	53,203	2,929	26,071

* For sale only.

Our 32nd Year OF SUCCESS IN CASTING IMPROVEMENT!

Clifford B. Cornell

Thanks A Million!

• A MESSAGE TO THE MANY FOUNDRIES WHO HAVE USED FAMOUS CORNELL CUPOLA FLUX—FOR YEARS.

Through your many repeat orders, you have given us a most important endorsement of our product. We appreciate this, and let us assure you that we will spend all our effort to serve you still better in the days to come.

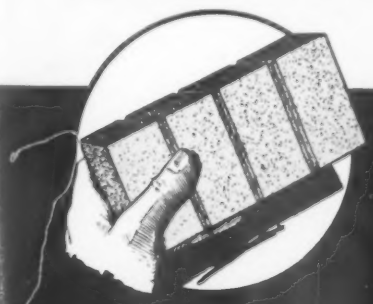
• A PROMISE TO NEW USERS

We are happy to list you among the many users of Famous Cornell Cupola Flux. It is gratifying that you, too, have taken the step that pays off through sulphur reduction, improved molten metal structure, reduced casting rejects and cupola maintenance.

Clifford B. Cornell
SECY.-TREAS.

Famous CORNELL CUPOLA FLUX

IN SCORED BRICK FORM



FAMOUS CORNELL FLUXES
Trade Mark Registered

The CLEVELAND FLUX Company
1026-1036 MAIN AVENUE, N. W., CLEVELAND 13, OHIO
Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

TIME PROVEN METAL CLEANSER--

Famous CORNELL FLUX

THROUGH ITS USE, FOUNDRIES OBTAIN AND MAINTAIN HIGHER CASTING QUALITY, MEET COMPETITION EASIER.

In the iron foundry industry amazing results in casting improvement are reported by users of—

Famous CORNELL CUPOLA FLUX

Here's the payoff for adding a little Famous Cornell Cupola Flux to each charge of iron:

- **Clean Molten Metal.**
- **Hotter, freer flowing metal.**
- **Big reduction of sulphur.**
- **More fluid slag.**
- **Sounder, tougher castings with more even grain.**
- **Easier, smoother machining.**
- **Reduction of costly rejects.**
- **Cleaner cupolas, cleaner drops.**
- **Longer lasting cupola lining.**
- **Greatly reduced cupola maintenance and labor.**

A trial is convincing

WRITE FOR BULLETIN NO. 46-B

SCORED BRICK
(Pre-Measured)
FORM
TAKES BUT SECONDS TO USE

This exclusive form makes the cost of fluxing molten metal with Famous Cornell Cupola Flux surprisingly low. *No digging out of container, no weighing, no measuring.*
You simply toss this flux into your cupola with each ton charge of iron or break off one to three briquettes (quarter sections) for smaller charges as per instructions. The solid form prevents blowing out with the blast, insuring full efficiency.

MALLEABLE FOUNDRIES, with cupola operation, are showing a rapid trend towards the use of Famous Cornell Cupola Flux. Reports of greatly improved casting production come from every direction. Furthermore, there is a considerable reduction in cupola maintenance labor and cost. The life of cupola lining, whether brick or stone, is greatly prolonged.

NEW DIRECT REPRESENTATIVE: On and after November 27, 1949, Chris. T. Jensen, a native of Wisconsin residing in Davenport, Iowa, will be our direct representative for state of Wisconsin.

The **CLEVELAND FLUX** *Company*

1026-1036 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

Famous CORNELL FLUXES *for* BRASS, ALUMINUM, LADLES

BRASS FLUX.

Cleanses molten brass even when dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves you considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

ALUMINUM FLUX.

Cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Working conditions are improved due to Exclusive Formula which greatly reduces obnoxious gases. The dross does not contain any metal after this flux is used.

LADLE FLUX.

Keeps ladles clean and cleanses iron. Before tapping cupola, place a few ounces of this flux in bottom of ladle. It thoroughly cleanses the iron, bringing any impurities to the top of metal in the form of a cake which is easily skimmed off. If molds are some distance from cupola, a handful of this ladle flux sprinkled on top of metal acts as a cover and prevents chilling.

FAMOUS CORNELL FLUXES
Trade Mark Registered

THE FOUNDRY DATA SHEET—DECEMBER 1949

Proposed Revised Tentative Methods of

PREPARATION OF MICROGRAPHS OF METALS AND ALLOYS

INCLUDING RECOMMENDED PRACTICE FOR PHOTOGRAPHY AS APPLIED TO METALLOGRAPHY

ASTM Designation: E2— -49T

(Continued from November issue)

(c) With objectives of the photographic type, when used to give 30× or less linear magnification, oblique illumination from two sides is frequently used if the surface of the specimen is a fracture. Two sources of light of unequal intensities are used, one placed on each side of the specimen. The two sources may be regular Mazda bulbs, of different wattage or the same wattage placed different distances from the specimen. The weaker source is used to partially neutralize the deep shadows cast by the stronger light.

A luminous tube formed in a ring to surround the objective will produce dark field illumination. Shadows caused by rough surfaces or fractures can be eliminated by carrying the light source round and round the specimen (and camera) during the entire time of exposure.

(d) With objectives of the photographic type, when used to give 30× or less linear magnification, dark field illumination can be secured by surrounding the objective with a series of small electric bulbs contained within an annular reflector.

(e) The simulation of diffuse "daylight" illumination of objects, particularly those having irregular surfaces, can be accomplished by using "neon sign" techniques in which the tube may be coiled into a helical, beehive, or ring shape to surround the objective or sample, or both, in order to provide light from all angles. This has the effect of "filling" the objective, reducing highlights, and illuminating areas and contours not amenable to point-source lighting.[2]

Types of Illumination

10. (a) When the projected image is secured with an objective and eyepiece, vertical illumination is secured by introducing between the objective and the eyepiece,[3] near the objective a plane glass disk making an angle of 45° with the axis of the microscope. Vertical illumination indicates that each point within the field of the microscope received a cone of light of angular extent equal to the angular aperture of the objective. All commercial microscopes made particularly for metallurgical use are equipped with a plane glass reflector or other device together with suitable condenser lenses which makes this possible (see Fig. 3). A valuable asset in vertical illumination is ability to control the angular extent of the cone of illumination. This type of illumination is suitable for the examination and photography of all polished metal specimens and all specimens should be examined first in vertical illumination. Controlling the angular extent of the cone of illumination frequently brings out detail of low contrast which may otherwise be lost. Too serious a reduction of the angular cone of illumination will bury fine detail and cause apparent thickening of detail still evident. Etched specimens, especially those which become very dark due to absorption of light, may appear veiled over when examined in vertical illumination. Examination by means of oblique illumination, polarized light, or dark field illumination may bring out details obscured by these conditions. Oblique illumination can be

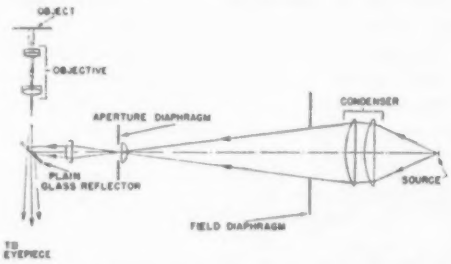


Fig. 3—Vertical illuminator for metallurgical microscope

secured by decentering the diaphragms referred to above for controlling the angular extent of the cone of illumination.

(b) Oblique illumination may also be secured with an objective and eyepiece by introducing between the objective and eyepiece, near the objective a mirror or a totally reflecting prism which covers up only half the aperture of the objective. These reflectors will greatly increase the brightness of the specimen but the objective will not have as great resolving power as is secured with the plane glass reflector. This will result in loss of fine detail in the specimen. This form of oblique illumination is not recommended for use with objectives whose focal length is less than 8 mm.

(c) Polarized light can be secured with an objective and eyepiece in either vertical illumination or oblique illumination by introducing a polarizing device[4] between the light source and the reflecting device between the ob-

[2] L. L. Wyman, "A Tube Illuminator for Metallography," *Metal Progress*, Vol. 36, p. 262 (1939).

[3] With objectives of long working distance, the plane glass reflector can with advantage be placed between the objective and the object, as has been described in Section 9 *(a)*. This position of the reflector leads to better contrast in the final image than when the reflector is between the eyepiece and the objective.

[4] Some metallographs have built-in polarizer and analyzer which is called a polarizing vertical illuminator.

Proposed Revised Tentative Methods of

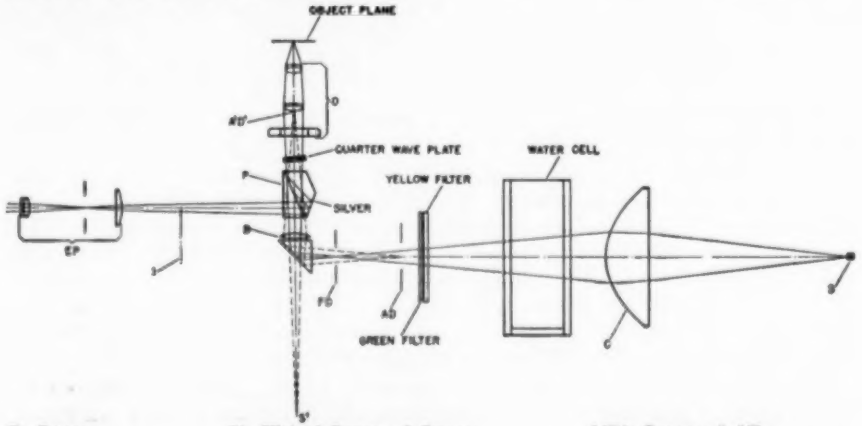
PREPARATION OF MICROGRAPHS OF METALS AND ALLOYS

INCLUDING RECOMMENDED PRACTICE FOR PHOTOGRAPHY AS APPLIED TO METALLOGRAPHY

ASTM Designation: E2— -49T

jective and eyepiece. The polarizer should be orientated so that its plane of vibration is perpendicular to the plane of incidence on the reflector. This can easily be determined by rotating the polarizer while observing a specimen and noting the position where the specimen is brightest. To secure any benefits from polarized light an analyzer must be put between the object and the eye. The analyzer is also a polarizing device but is called an analyzer because it is used to analyze the light which has been reflected from the specimen. If the analyzer is to serve this purpose there must be no other reflecting parts not orthogonal to the vibration direction of the polarizer between the objective and the analyzer. With such equipment, the specimen must be rotated so that the effects of plane polarized light incident on it can be seen in all azimuths. This illumination will remove surface glare (specular reflection) of dark specimens. When a change in orientation from grain to grain exists and the micro grain boundaries are indefinite (Note), examination of the specimen with polarized light will usually bring out the actual grains. Inclusions can be classified as to their possible nature. Other applications may arise with consistent application (see Fig. 4).

NOTE: *Examples.*—Austenite grains in a martensite specimen. Dendrites in cast alloys. Grain size of an annealed eutectoid structure.



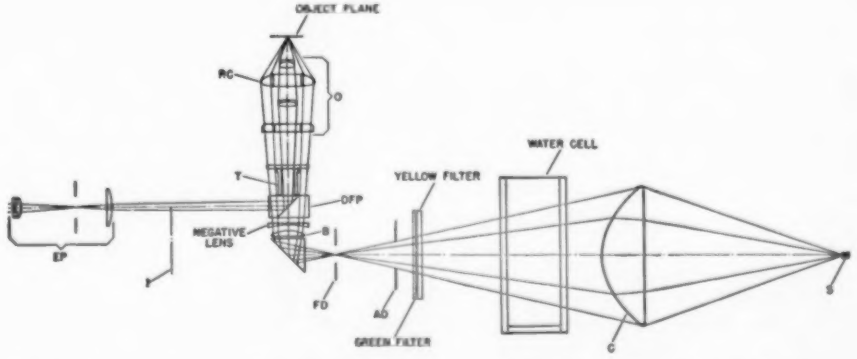
S—Source
C—Condenser Lens
AD—Aperture Diaphragm
FD—Field Diaphragm
S'—Virtual Image of Source
B—Condenser Lens
P—Polarizing Vertical Illumination Prism
A'D'—Image of AD
O—Objective and Glass Base
EP—Camera Eyepiece

Fig. 4—Bright-field illumination

The light reflected from anisotropic opaque minerals is rotated in azimuth and weakly elliptical when vertical illumination with polarized light is used. Devices for analyzing this reflected light are known as elliptical compensators and are commercially available. They are suggested as useful tools for differentiating biaxial and uniaxial opaque materials and for identifying materials within the latter classification. The dependence of the results on the surface condition suggests application of the method to the testing of old or new polishing techniques and to the measurement of the rate of growth of oxidation films, etc., on freshly cleaved or polished crystals.

(d) Dark field illumination may be secured with an objective and eyepiece by surrounding the objective with a beam of light which is concentrated on the specimen in such a manner that no light can be specularly reflected from the specimen and enter the objective. Special apparatus for producing this kind of illumination has been made by the various manufacturers of metallurgical microscopes. The result of examinations in dark field illumination is the negative of bright field illumination. Highly reflecting surfaces are not visible. The smallest pits or the thinnest lines, such as scratches, cracks, or grain boundaries stand out as bright spots or lines under dark field illumination (see Fig. 5).

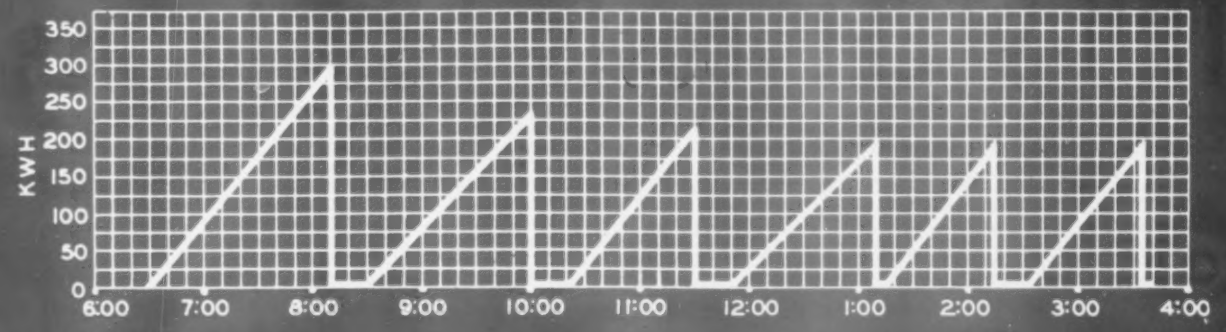
(To be continued)



S—Source
C—Condenser Lens
AD—Aperture Diaphragm
FD—Field Diaphragm
B—Condenser Lens
DFP—Dark Field Prism
T—Glass Tube
O—Objective and Glass Base
RC—Ring Condenser (for high powers, replaced by Reflector)
I—Position of Swing-Out Prism
EP—Camera Eyepiece

Fig. 5—Dark-field illumination

DETROIT ROCKING ELECTRIC FURNACE



NOTES ON DAILY OPERATION OF TYPE LFY, 700-LB. CAPACITY DETROIT ELECTRIC FURNACES MELTING NICKEL:

TOTAL HOURS OPERATION—9¼ hrs.; NUMBER OF HEATS—6; WEIGHT PER HEAT—900 Lbs.; TOTAL METAL MELTED—5450 Lbs.; TOTAL KILOWATT HOURS—1323; KILOWATT HOURS PER TON—486.

PROFITS FROM DETROIT ELECTRIC FURNACE OPERATION IN PAST YEAR: $150,000.00.

NOTES ON TWO-YEAR OPERATION OF SAME FURNACES:

COMPANY—A Well-Known Automotive Plant (name on request); PERIOD—(Sept. 9, 1946 to Sept. 18, 1948); TOTAL TONNAGE MELTED—1,970; AVG. ELECTRODE USAGE—8.65 Lbs. per Ton of Nickel at .23/Lb.—$1.99; AVG. POWER CONSUMPTION—625 KWH/Ton at 1¼c—$7.81; AVG. REFRACTORY COST—$4.00/Ton.

AVG. TOTAL MELTING COST OVER TWO YEARS: $13.80 PER TON.

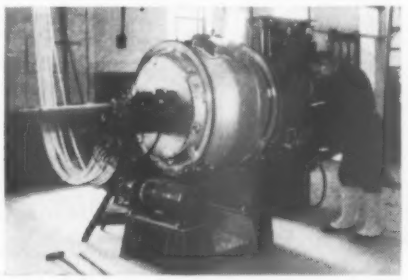
Maximum QUALITY CONTROL • *Low* MELTING COST

FOR FERROUS AND NON-FERROUS METALS

This record is typical of annual savings obtained with Detroit Rocking Electric Furnaces. An important additional advantage is the fine degree of quality control obtained in every melt.

Other economical features are: optimum power use and all-electric operation eliminating handling and storing of messy, bulky fuels; positive control of melting speed, quality and composition; exact duplication of previous melts; and control of other melting factors. Out-of-production time is minimal. Burned-out linings are quickly, easily replaced by spare, previously-lined furnace shells.

Fast, always uniform outputs and low metal losses by shrinkage save production time, labor and expense. Shop borings, turnings and scraps are reduced with least loss from oxidation.



The electric arc is automatically established clear of the molten bath at all times. The metal never becomes a part of the electric circuit. This method assures uniform temperatures within the melting chamber.

Detroit Rocking Electric Furnaces are available with automatic electrode control and automatic rocking control. There is a wide range of sizes to choose from . . . from 10 to 4000-lb. capacities. Chambers are of conical or cylindrical type. All furnaces are individually designed to meet your plant electrical specifications.

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Foreign Representatives: In Brazil—Equipamentos Industrias "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi, Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Casco, S. de R. L. Atenas 32 - Despacho 14, Mexico City, D. F.

*These Case Histories Prove

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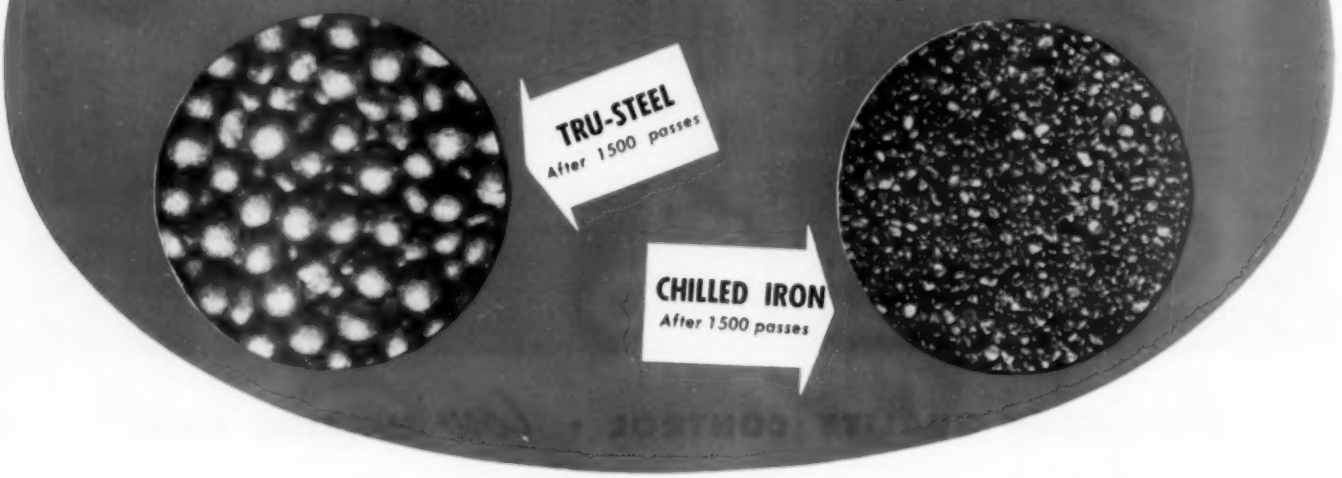
. . . AND you can prove it to your own satisfaction by placing a trial order today. TRU-STEEL costs less because it lasts longer. It is perfectly formed of electric-induction furnace steel that has received a full heat treatment — not just a draw or anneal. It wears down slowly without breaking down . . . machine wearable parts last longer, less maintenance labor is required and there is less abrasive to ship and store.



* BLADE LIFE INCREASED FROM 3 WEEKS TO 3 MONTHS

When an eastern brass foundry* switched to TRU-STEEL they found that blades lasted 4 times as long. Abrasive consumption dropped from 8.7 lbs. of chilled iron per load of castings to 2.8 lbs. of TRU-STEEL.

* LASTS 5 to 6 Times LONGER

A Canadian Manufacturer* writes as follows: "We find TRU-STEEL shot lasts from 5 to 6 times as long as ordinary shot . . . . . In general TRU-STEEL shot costs half as much as ordinary shot, cuts down on maintenance and costly parts with less shot handling and storage."

* ABRASIVE COSTS REDUCED 65%

At a large soil pipe foundry*, accurate records were kept comparing TRU-STEEL and chilled iron shot over a period of 104.5 wheel hours and only 3.349 lbs. of TRU-STEEL shot was needed to do the same work as 19.27 lbs. of Chilled Iron. Result: a saving of $80.64.

* WEARABLES & MAINTENANCE LABOR REDUCED OVER 70%

A steel foundry* reports the use of TRU-STEEL Shot resulted in a saving of 73% on wearables. 63% on abrasive consumption, and 80% on maintenance labor.

* USING 90% LESS ABRASIVE

An eastern machinery manufacturer* now uses only 61.5 lbs. of TRU-STEEL shot to shot peen 1000 loom rollers. Previously 600 lbs. of chilled iron shot was required for the same job.

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GRAY IRON FOUNDERS REVIEW ACTIVITIES

(*Continued from page* 81)

the new schools which will join the FEF program. Mr. Price paid tribute to the society for its initial contribution to the first fund raising campaign.

Frank G. Steinebach, THE FOUNDRY, Cleveland, reported briefly on the activities of the National Castings Council. Walter L. Seelbach, Superior Foundry Inc., Cleveland, told of the Foundry Industry Advisory Committee setup developed by the Munitions Board and reported on recommendations made at a meeting of the Subcommittee on Gray Iron Castings during the past year. Mr. Seelbach believes that the industry is exceptionally well organized to present its problems to the various agencies connected with the military establishment.

Bigness Costs Money

We are suckers for bigness, in the opinion of former congressman Everett M. Dirksen, Pekin, Ill., who addressed the luncheon meeting. Mr. Dirksen attributed this development to the effect of two major wars, and to the indifference of the American people. Bigness is a matter of genuine concern because it costs money, produces great waste, threatens to break down the government and provides a concentration of power that is best illustrated in spending and taxes.

If the tendency toward bigness is to be corrected, Mr. Dirksen believes government must be cut down to size, it must be made streamlined and efficient, it must be resistant to pressure groups, and it must see that power is brought back to the grass roots. Action is needed on the part of everyone who believes in maintaining our freedom from the results of government bigness.

The afternoon session was devoted to a symposium on nodular graphite gray iron, with Charles O. Burgess presiding. Donald J. Reese, International Nickel Co., New York, approached his discussion of nodular or ductile iron from the commercial angle. He expressed the opinion that this product represents one of the greatest developments of all time in the field of ferrous metals. Producing ductile iron that will pass rigid testing and inspection is not as simple as adding a few pounds of magnesium alloy to the ladle, and therefore foundrymen should endeavor to become completely informed on the development. Mr. Reese pointed to the extensive research work on the project undertaken by his organization. One factor of present production costs is ability to utilize the knowledge already available rather than each individual organization starting the study from scratch.

The speaker stated that when small quantities of magnesium are introduced successfully into the iron-carbon-silicon alloys, ferrous materials essentially free of sulphur are produced. Lack of sulphur permits manganese to function as a potent alloy. For certain of the six basic types of ductile iron it is desirable to avoid the alloy influence of manganese. To produce a ferritic type ductile iron having the greatest values in shock resistance, as-cast elongation and reduction in area, amount of manganese may be 0.25 per cent or thereabouts, the lower limits being determined by the amount of manganese present in raw materials available. Manganese stabilizes pearlite and when the objective is to produce a pearlite type of ductile iron, the alloy influence of manganese is decided.

In ductile irons silicon is used mainly as a potent alloy, according to Mr. Reese. Phosphorus forms a brittle iron-phosphide constituent in all ferrous materials and optimum engineering properties are obtained in low-phosphorus ductile irons. The optimum form of graphite, a sphere, in ductile iron permits wide latitude in the amount of carbon present with relatively minor influence on the engineering or physical properties of the product. Carbon content of the irons generally is 3.5 per cent or more.

In conclusion, Mr. Reese predicted that production of this new cast product in 1950 would reach significant figures, and that its availability will increase the total percentage of engineering components which can be produced as castings.

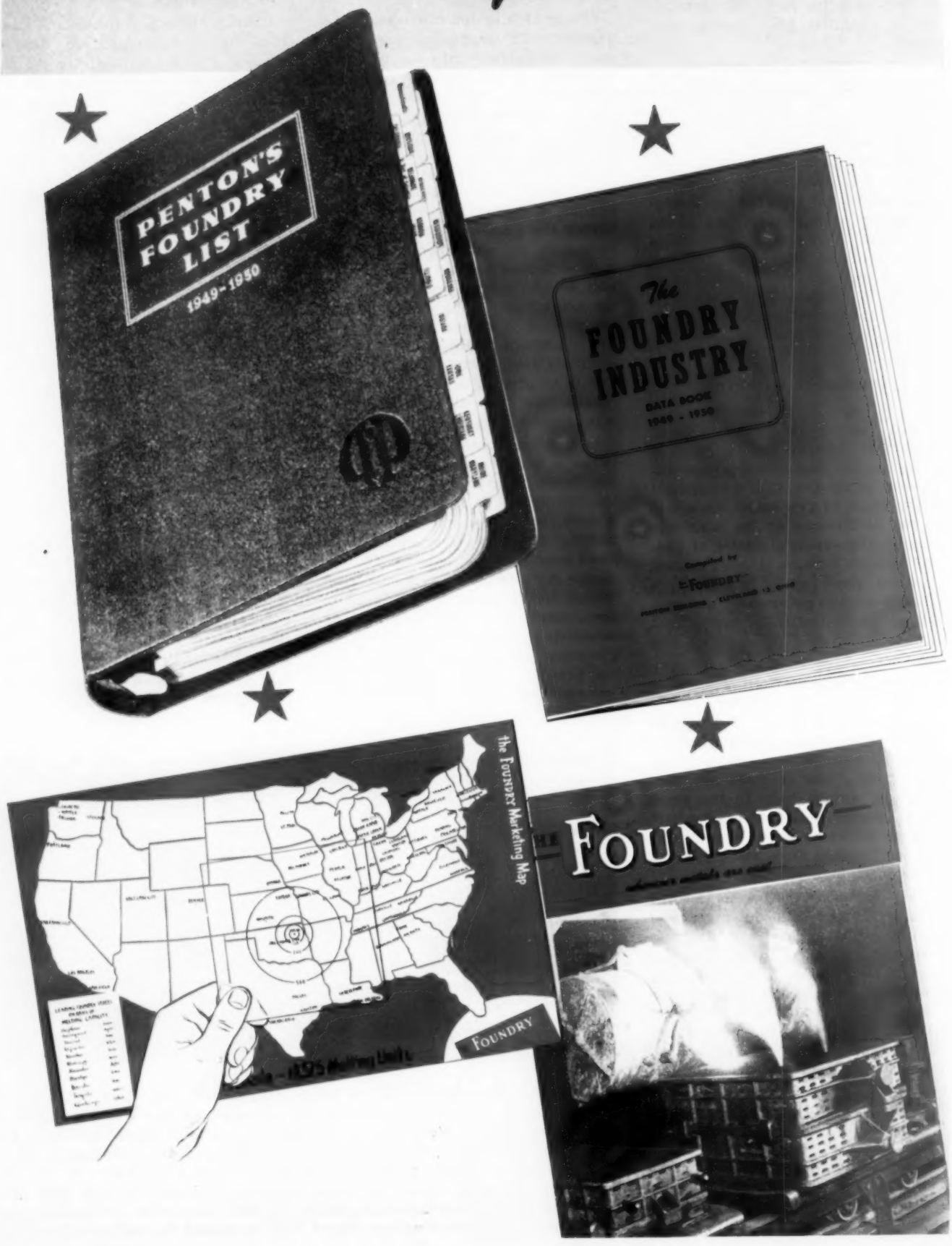
Charles Donoho, American Cast Iron Pipe Co., Birmingham, used a number of slides to illustrate the results obtained in adding alloys of magnesium to cast iron, methods of testing nodular irons and properties obtained, and the potential applications of the metal. Mr. Donoho stated that the copper-magnesium alloy is not too reactive for ordinary foundry use, gives reasonable recovery and does not require over 1½ per cent addition, even in a high-sulphur base iron. Either copper-magnesium or nickel-magnesium alloy additions cut down on as-cast ductility. Cerium-magnesium addition is attractive because so little is required, it is not violent, and good properties are secured at reasonable cost. The magnesium-iron-silver alloy is attractive because of low cost and because no subsequent inoculant is required. Mr. Donoho said the results from this alloy are rather inconsistent, as it is sulphur sensitive and the amount required is excessive.

Mr. Donoho stated that the transverse test can be used for nodular irons, at least in the as-cast state. He warned against trying to meet steel or malleable type tensile specifications, especially elongation, by machining the test specimen from 1.20-in. round bars or any section

(*Concluded on page* 140)

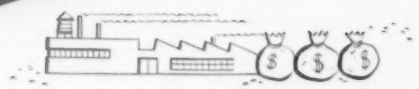
MEMORIAL: Foundry Division of Eaton Mfg. Co., Vassar, Mich., on Sept. 9 honored three of its employees—Elmer Heidenberger, Herbert Loree, and Hubert Reasor—who died in World War II. A marble memorial, designed and executed by Marshall Fredericks, nationally known sculptor, and James Bennett Hughes, architect, was dedicated on the grounds of the plant. The memorial was unveiled by Edward C. Hoenicke, Foundry Division general manager, who also presented an inscribed bronze medallion to each next of kin of the deceased servicemen. The local American Legion Post conducted the military ceremonies

New Marketing Information



on the Foundry Industry....

To help you determine your potentials in this active and important market



THE PENTON FOUNDRY LIST, 1949-50 . . . Locates and Gives Detailed Information on All Foundries in the U. S. A. and Canada. Here is up-to-date information that will help you find and evaluate new prospects; analyze sales territories; determine market size and scope. It gives you accurate details on the name and address of each foundry, type, number and capacity of melting units, type of metal melted and operations by departments. There's no other single source of this data—and at $50 per copy it costs less than 1c per name.

THE FOUNDRY INDUSTRY DATA BOOK, 1949-50 . . . Helps in Making Detailed Market Analyses. Based on information contained in the newly revised Penton Foundry List, it gives you a state-by-state breakdown of the industry. It shows distribution of foundries by size according to employment; by melting units and their capacity; by types of metal cast. Other analyses show departments operated and casting methods. Write for a copy—it's yours for the asking.

THE FOUNDRY MARKET MAP . . . Helps Locate Your Market Whether Regional or National. If your market is measured in miles, you'll want to study this new map. It will show you how many foundries are located within 100 miles of your base of operations. Then it will show you how many more foundries are added by each successive increase in your sales horizon. Ask your FOUNDRY representative to show you this coast-to-coast picture of the foundry market. Or drop us a line—we'll arrange to have him show it to you.

THE FOUNDRY MAGAZINE . . . Gives Mass, Month-By-Month Coverage of Over 95% of the Industry's Melting Capacity. The FOUNDRY carries your product story and sales messages to more than 35,000 Foundrymen. It reaches all those in key positions, many of whom your salesmen may never see, yet who have a hand in purchasing foundry equipment, materials and supplies. When you want to sell to the foundries—tell it in The FOUNDRY.

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THE FOUNDRY—

where metals are cast...

A PENTON PUBLICATION

PENTON BUILDING, CLEVELAND 13, OHIO

(*Concluded from page* 137)

which may have centerline shrinkage. In conclusion, Mr. Donoho stated he does not expect nodular graphite cast iron to replace much gray iron. In most instances, gray iron is used because it contains flake graphite, which confers many valuable properties, such as wearing qualities. In his opinion, nodular iron provides a metal for castings which has properties between those of gray iron and steel. Nodular iron probably will not supplant any other foundry metal to any great extent, but the industry as a whole should benefit from the acquisition of a new ferrous material.

Mr. Burgess discussed in some detail the potential markets for nodular iron, and some of the production problems.

Reasons behind union leaders' concentration on pension and welfare subjects were explored by Lee Shaw, Seyfarth, Shaw & Fairweather, Chicago, in Friday's opening session. An important factor, he said, is political rivalry between the various union chieftains; another is the power a pension fund may give its administrator. This power, he asserted, may leave a worker no choice but to join the union and remain in good standing to receive benefits of the program.

Pensions Are Complicated

Pensions, he observed, are the most complicated of all collective bargaining subjects. A minimum of six-months' study should be undertaken by a company before beginning negotiations with the union. The subject's importance to future operation and financial structure of the company warrants close attention by top officials, but also necessitates consultation with individuals all the way down the supervisory ladder. The final agreement should clearly define every pertinent point and specifically prevent re-opening of negotiations on the pension subject throughout the contracts life. This, incidentally, should be of longer duration—from three to five years—as compared with one to two years for other negotiated agreements, he added.

Means by which gray iron foundries can increase sales were suggested by Edward Marker, vice president, Fuller & Smith & Ross Inc., Cleveland, and GIFS advertising counsel. The industry's problem, he asserted, is to effectively sell ideas, not pounds or tons of castings. "Isn't the principal task to sell the basic idea that gray iron has a combination of advantages not matched in any other metal?" he asked. Mechanizing the selling job is the next step. "Have you studied your selling problems as carefully as you have your production problems? Have you explored every possible way to mechanize your selling operations to make them more efficient and less costly?" he then inquired.

That safety begins with top management was the thesis of James I. Banash, consulting engineer, Chicago. If the foundry industry, by the actions of its executives, does not voluntarily bring down its accident frequency rate "it will be brought down by the various instruments through which public opinion makes itself felt," he warned.

The average frequency rate of 45 for foundries is too high. "It has been proved too high by the heavy industries which do so much better. It has been proved too high by the individual foundries themselves which consistently provide their workers with jobs that are two, or four or five or 15 times more safe than the national average," he declared.

GEORGE W. CANNON
Gray Iron Founders' Society Medallist

On the average the number of lost time injuries per million man-hours is 2½ times greater in plants employing under 100 than in large plants. Severity rate is almost five times greater in small plants. This proves, he said, that injuries can be prevented and indicates that "big" industrialists seem to be more interested in their prevention.

Small companies cannot economically have the complex committee organizations of larger companies, but the small employer "is less dependent on the reports of other people, he is in direct contact with the conditions under which his people work, and he may well be in a better position to shorten the distance between a dangerous situation and its cure, especially if he shows a friendly interest in his men and sets the proper example himself." The manager of a small company cannot have a full-time safety engineer, "but he can reach the resources of the Gray Iron Founders' Society, the National Safety Council, the American Standards Association, his insuring company, the Department of Labor, technical and professional societies and all of the other agencies available to the big outfit," he added.

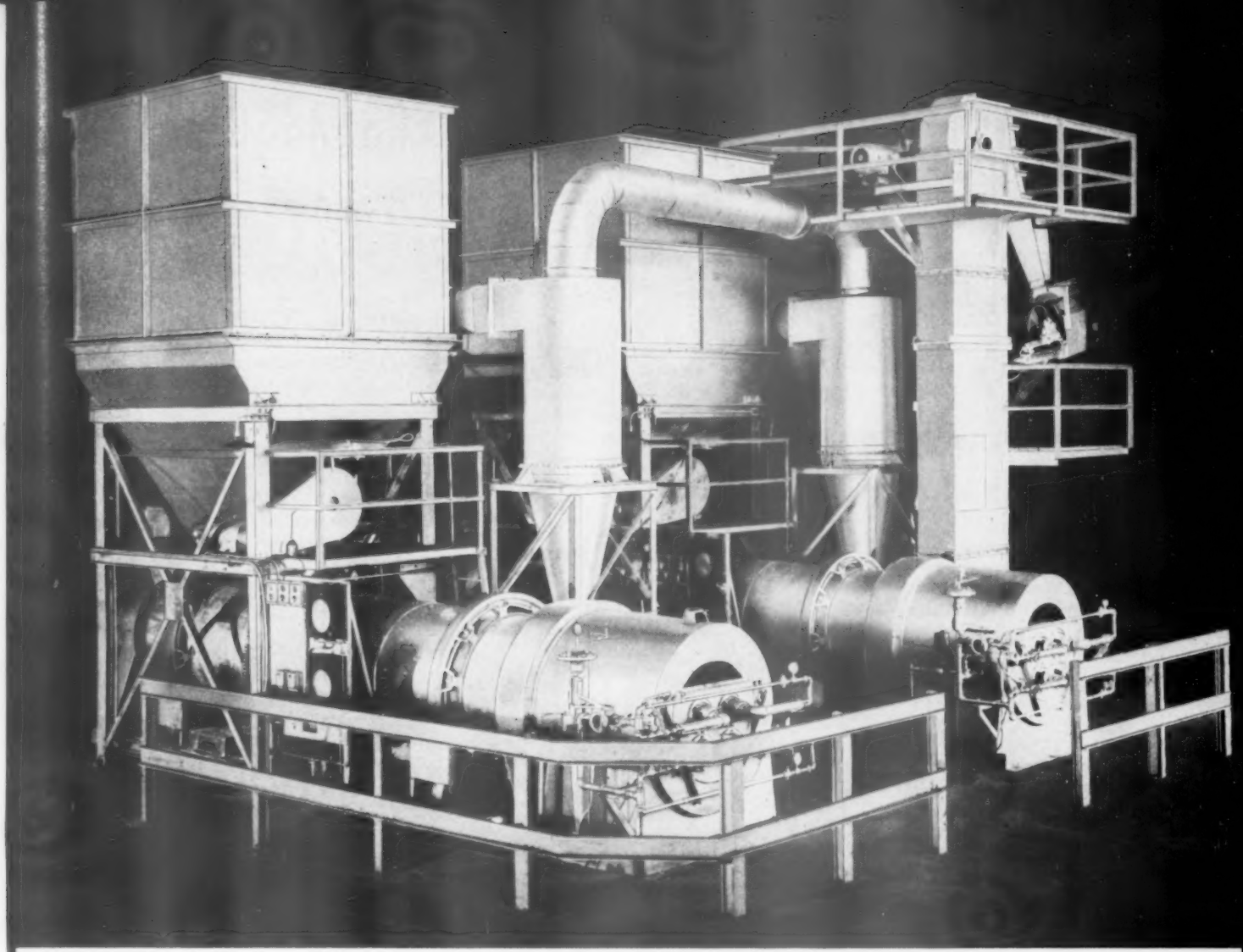
Following introduction of the officers and members of the board of directors at the concluding luncheon session, Mr. Good presented citations to four men in recognition of the outstanding services they have rendered to the gray iron foundry industry. Recipients of these citations were: Joseph Bruce, Bowler Foundry Co., Cleveland; Don McDaniel, Hamilton Foundry & Machine Co., Hamilton, O.; Homer Britton, Cleveland Foundry Co., Cleveland. A citation was awarded posthumously to James B. Coltman who was associated with Bullard Co., Bridgeport, Conn., at the time of his death. John E. McIntyre, retiring GIFS vice president, presented a citation also to Mr. Good for his meritorious work on behalf of the industry.

Gold Medal Is Awarded

The GIFS Gold Medal Award to George W. Cannon, until recently chairman of Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., was presented, in Mr. Cannon's absence, to his son, George W. Cannon Jr.

The medal award to Mr. Cannon honored him "for his outstanding achievement in bringing to reality his dream of a model foundry educational institution at Hackley Manual Training School in Muskegon, Mich; for his work as chairman of the Foundry Industry Advisory Committee to the War Munitions Board, and for his progressive and forward looking ideas regarding every phase of foundry operation and practice; and bestows upon him a gold medal, its highest award, in recognition and appreciation of his unselfish service on behalf of the industry."

In a humorus but thought-provoking talk entitled "Taxes, Women and Hawgs," Col. Jack Major asserted the most serious problems in America are ruinous taxation, juvenile delinquency and government interference in the farm industry. Spiced with personal experiences with all three subjects, Col. Major's home-spun remarks uncovered the dangers ahead if the trends in these areas are not reversed in the immediate future.



Drying Core Sand to less than ½ of 1% moisture

DRYING of core sand offers many present day advantages. It permits the use of undried sand from many different sources of supply, resulting in better deliveries, more favorable prices and lower freight rates. It eliminates all variation in the moisture content going into the mix, permitting exact control of each ingredient, and exact duplication of any mix time after time, by different operators. Core blower operations do not suffer from overwet mixes. Dried sand disperses more readily in the mix, saving on binders and core oil. Core structure benefits from a uniform bake, reducing scrap losses due to core failures.

The installation pictured above, which has been operating in a mid-west foundry for about five years, consists of two complete and self contained systems installed side by side. Either unit can be operated singly by itself, or both units can be operated together, depending upon the plant requirement.

The wet sand is loaded into the storage bins with a clam. It is fed into the dryers, each 48" in dia. by 20' long with variable speed feeders. The dried sand is discharged on to a belt conveyor—is carried to the elevator—and then to the core room on a second belt conveyor. The burners are automatically controlled to save fuel, and to assure the discharge of a sand of uniform dryness regardless of variations in the rate, or moisture content of the feed. Fines are caught in a Bartlett-Snow cyclone dust collector and returned to the system again.

Economical and dependable, this installation reflects the advantage of Bartlett-Snow's intimate familiarity with the needs of practical day-to-day foundry operation. Let the Bartlett-Snow foundry experts work with you on your next sand, mold and castings handling problem. The C. O. Bartlett & Snow Co., Cleveland 5, Ohio. Engineering representatives in New York, Baltimore, Detroit and Chicago.

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DESIGNING AND CONTRACTING ENGINEERS

For the Foundry Industry

SAND, MOLD AND CASTINGS HANDLING EQUIPMENT

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION

Conducts 31st Annual Meeting

By FRANK G. STEINEBACH
Editor
THE FOUNDRY

PROGRAM for the 31st annual meeting of the Foundry Equipment Manufacturers' Association, held at the Greenbrier, White Sulphur Springs, W. Va., Oct. 13-15, featured discussions of the general business situation, a study of activity in the foundry equipment industry, and reports on the work being carried on by committees. The first day of the gathering was devoted to meetings of the various product groups of the organization.

During the meeting, the following were elected to the board of directors: Aubrey J. Grindle, manager, equipment department, Whiting Corp., Harvey, Ill.; Thomas Kaveny Jr., president, Herman Pneumatic Machine Co., Pittsburgh; Victor F. Stine, vice president, Pangborn Corp., Hagerstown, Md. Following the meeting, the new board of directors elected John Hellstrom, vice president, American Air Filter Co., Louisville, as president of the association, and C. V. Nass, vice president, Beardsley & Piper Co., Chicago, as vice president. Arthur J. Tuscany, Cleveland, was re-elected executive secretary and treasurer.

In opening the first session, William L. Dean, president, Mathews Conveyer Co., Ellwood City, Pa., and president of FEMA, stressed the need for a sound concept of depreciating equipment by age and use. Present area of equipment policy is backward and needs improvement badly. Mr. Dean recommended a study of a recent publication of the Machinery Allied Products Institute, entitled "Dynamic Equipment Policy."

Speaking on "The Climate in Which We Do Business," Earl L. Shaner, chairman and treasurer, Penton Publishing Co., Cleveland, publisher of THE FOUNDRY, considered some of the short and long term social and political trends which will have a vital influence on all types of business enterprise. In discussing the strike situation in the steel and coal mining industries, Mr. Shaner indicated the most important factor was not the problem of contribution to the pension plan, but a drive on the part of labor leaders to provide industry-wide control. He indicated that if collective bargaining can be on the basis of individual companies, the employees, the company and the public will get a better deal. However, because industry-wide bargaining gives more power to the union leaders, the drive is in that direction.

New insignia adopted by the Foundry Equipment Manufacturers Association

During the past decade, the output per man-hour has increased less than in any recent decade in our history, although more money has been spent during that period for equipment. Men are not working with the enthusiasm of previous years, according to Mr. Shaner, due to a number of factors which include less pride in craftsmanship, the attitude of the young people who have returned from the war, the gimme attitude and the feeling that the world owes the individual a living; political and social entanglements; and the attitude of our top political leaders. As remedies, Mr. Shaner indicated the need for real work in our own backyard to get out the vote on the next election.

The new film, "This Moving World," recently released by the Malleable Founders' Society, was shown to the group. Members in attendance were high in their praise of the excellence of the production.

Arthur J. Tuscany, executive secretary, reported in some detail on the work of product groups, the public relations committee and the statistical committee. Mr. Tuscany recommended that members study carefully the various reports of the association and the suggestions made by committees as means of assisting the individual companies in the conduct of their business.

A report on the accomplishments of the Foundry Educational Foundation and the plans for the future work of that organization was presented by Claude B. Schneible, Claude B. Schneible Co., Detroit, a director of FEF. Mr. Schneible urged active participation of equipment producers in the present fund-raising campaign of the foundation.

(*Concluded on page* 144)

JOHN HELLSTROM

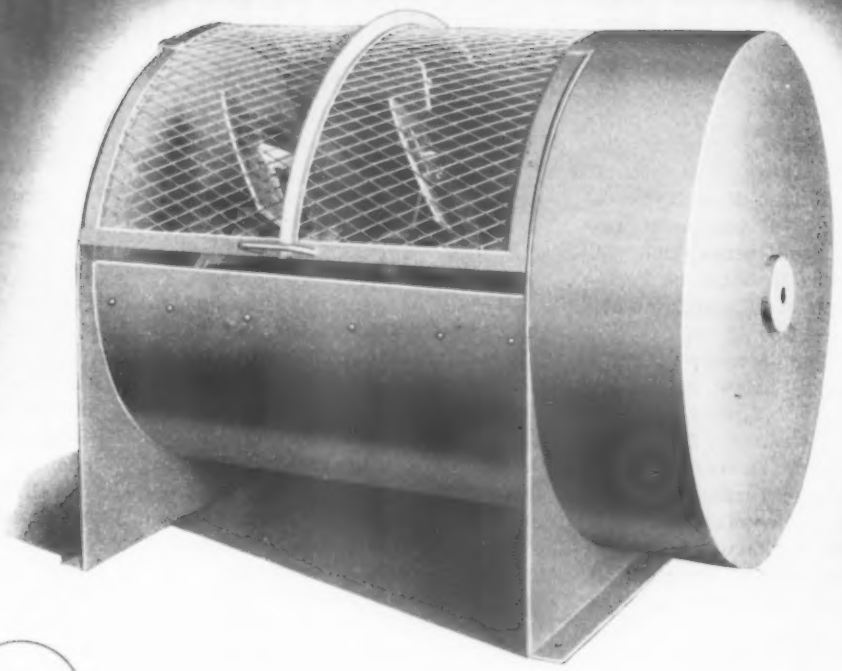
C. V. NASS

ARTHUR J. TUSCANY

Introducing the New, Improved

MULTI-MIXER

for mixing Core Sands, Molding Sands and Cupola Patch Mixes



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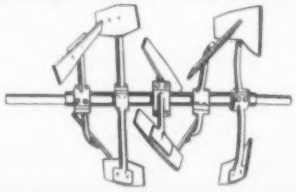
PERFECT MIX
is the patented, scientific arrangement of the paddles



IT KNEADS, AS IT TURNS, AS IT RUBS
10 TIMES FOR EACH REVOLUTION

MIXES IN 4 MINUTES • DISCHARGES IN ½ MINUTE!

• "Better Mixes"... at a lower cost. That's why you'll be interested in the new MULTI-MIXER, Model AG. This is a completely new model... designed and built with the experience and knowledge gained from 1500 units now in operation. Here is a compact, efficient mixer in a range of sizes from 3 to 60 cu. ft. capacity. We believe it to be the most modern equipment of its kind on the market today... for better cores... better castings, write for complete details.

Note these time saving features:

- Completely Self-Contained
- Low Installation Cost
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- No Clutch or Belts
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- Quick Acting Discharge Door
- Rubs, Turns, Kneads — 10 times in Each Revolution
- Equipped with Manganese Wear Resistant Liners and Paddles.

MULTI-MIXERS are sold only thru nationally known foundry and equipment dealers. Consult your supply dealer or write direct.

MULTIPLEX MACHINERY CORP. ELMORE, OHIO

(*Concluded from page* 142)

C. V. Nass, chairman of the by-laws committee, presented an extensive report on suggested by-law changes. These were considered in detail and adopted at the meeting.

At the second business session, E. A. Borch, National Metal Abrasives Co., Cleveland, and chairman of the statistical committee, discussed the interpretation of FEMA business trend reports and methods of applying the results of statistical surveys to the individual company problems. John Hellstrom presented a report on the activities of the National Castings Council. Mr. Hellstrom is a representative of FEMA on the council.

The greater portion of the second session was devoted to a round-table discussion on "Rate of Activity in the Foundry Equipment Industry." The consensus indicated the belief that the volume of business during the coming year will follow closely the pattern of 1949.

With Otto A. Pfaff, president, American Wheelabrator & Equipment Corp., Mishawaka, Ind., as chairman, Anthony DeYoung, advertising manager, Whiting Corp., Harvey, Ill., as chairman of the public relations committee of the association, presented the report of that group. As a result of this report, the membership adopted a new insignia, a new slogan and recommended further consideration of other activities proposed in the report. The meeting also recommended the continuation of the work of the public relations committee.

THREE EASTERN AFS CHAPTERS HOLD CONFERENCE

At Stevens Institute, Oct. 21-22

By ROBERT H. HERRMANN
Associate Editor
and L. E. BROWNE
New York Editor
THE FOUNDRY

METROPOLITAN, Philadelphia and Chesapeake Chapters of the American Foundrymen's Society sponsored a successful regional foundry conference Oct. 21 and 22 at Stevens Institute of Technology, Hoboken, N. J., with an attendance of about 250.

The meeting was opened by Harold L. Ullrich, Sacks-Barlow Foundries Inc., Newark, N. J., general chairman of the conference. He introduced Dr. Harvey N. Davis, president, Stevens Institute of Technology, who gave a short welcoming address. E. W. Horlebein, national AFS president, also spoke briefly, commenting that the value of conferences such as this depends to great extent upon the effort put forth by those attending to participate in discussion at the various sessions.

On Friday, Oct. 21, gray iron, steel, and bronze and light metals groups met in three sessions each. The two meetings held Saturday morning were general sessions.

At the opening gray iron session, a round-table discussion on "Gating and Risering," Harry Kessler, vice president, Sorbo-Mat Process Engineers, St. Louis, gave a brief talk and led group discussion. In his talk, Mr. Kessler stated that the greater the mushy range in a solidifying iron, the greater the shrinkage. He suggested, therefore, that if the mushy stage could be determined for all types of irons, it would be possible to calculate the proper weight riser and shrinkage could be eliminated. Mr. Kessler described some work he has done in calculating shrinkage factors for various classes of irons. Weight of a riser for a given casting is determined by multiplying the weight of the casting by the factor.

The discussion period brought forth the comment that exothermic materials help to obtain adequate feeding, but that care must be exercised to exclude unburned material from sand used in subsequent molding. It will cause trouble in the mold. Additional comments were that cupola irons shrink less than do electric furnace irons, and that foundries sometimes encounter casting shrinkage when they switch from natural to synthetic molding sands. The reason advanced for this was that permeability is high in synthetic sands, and dissipation of heat and shrinkage go hand in hand.

A paper on "Carbon Control in Cast Iron" by Frederick W. Hanson, division manager, Electro-Metallurgical Division, Union Carbide & Carbon Corp., New York, was presented at the second gray iron session. R. A. Flinn, metallurgist, American Brake Shoe Co., was technical chairman.

In his paper, Mr. Hanson discussed cupola operation to produce desired carbon contents in the iron and methods for varying the type of carbon and graphitic structure. The importance of pig iron and steel scrap as the two basic constituents of cupola melted irons for carbon control was stressed. Mr. Hanson described the effect of blast pressure control over the coke bed and melting rates of the cupola on the final total carbon content and structure of the finished material. Various forms of carbon structure, such as coarse graphite, fine graphite, combined carbides, temper carbon and nodular carbon, were covered briefly, and slides showing the type of carbon structure produced and methods by which the given structures were obtained were shown. Applications were given for various types of structure as well as the desirability of the structures for these definite applications.

Concluding the gray iron program, Joseph A. Gitzen, president, Delta Oil Products Co., Milwaukee, spoke on "Mold and Core Sand Additives." George F. Watson, assistant chief chemist, American Brake Shoe Co., metallurgical department, Mahwah, N. J., was technical chairman.

Mr. Gitzen gave a short history of mold and core sand additives, touching briefly on some of the characteristics of the products and describing their development with changes in molding and coremaking practices. He went on to say that most foundrymen have a tendency to use too much of any additive. This generally leads to trouble.

In the speaker's opinion, plastic binders are going to play an important role in foundry practice in the near future. These binders will require use of the old type bank sands for hot strength in cores.

The bronze and light metals group round-table discussion on "Gating and Risering" was under the chairmanship of A. J. Howarth, sales engineer, Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J. In outlining practices at his shop, he stated that modern foundrymen not only must produce nonferrous castings to meet surface specifications, but also an interior structure that will stand up under x-ray examination; this is notably true in the aircraft industry.

Gating and risering practice should be aligned closely with pattern de-

(*Continued on page* 147)

Here's What a TULSA FOUNDRY says about CITIES SERVICE 30 Series Core Oil

Placing core for condenser manifold for oil refining equipment: Nelson Electric Manufacturing Company.

"We are very well pleased with the results your 36 core oil has shown, and we are now using it all together.

We are producing grey iron, semi-steel and alloyed iron, ranging in size and weight from 1¼ oz. to 2500 lbs. With the 36 core oil, the ratios vary but we use the same sand now for all sizes of cores with a resulting uniform strength. Large castings can be poured with unsupported runner boxes without breaking.

Since changing over to this oil we have saved considerable expense of using different sands, are using one-fifth less oil, and the baking time in the ovens has been reduced approximately two hours at a temperature of about 450 degrees F.

With the 36 core oil, only water and cereal binder are used with the sand and no other preparations are added. This oil is practically odorless and works good in either freezing or hot weather.

We certainly recommend your core oil, and the service you have given us has been excellent.

J. A. Dean, Manager Foundry Division
Nelson Electric Manufacturing Co."

Features of Cities Services 30 Series Core Oil that are building preference throughout the industry:

BETTER PERFORMANCE in core boxes, whether blown or hand rammed, whether sand is washed and dried or crude.

FASTER DRYING TIME without recourse to older types of drying oils.

WIDE RANGE OF WORKING TEMPERATURE — ready for use without pre-conditioning, whether in Texas or Montreal.

BAKES OUT AT LOWER TEMPERATURE, saving time, oven capacity and fuel.

HAS A CLEAN, PLEASANT ODOR.

MADE IN FIVE QUALITY RANGES accommodating all local foundry and core room conditions.

How about your foundry?

If these properties of 30 Series Core Oil look good to you, contact your local Cities Service representative for information and immediate service assistance. Cities Service Oil Company, Chicago, Cleveland, Kansas City, St. Paul and Toronto, Arkansas Fuel Oil Company, Shreveport.

DELCO CORE OILS • ROSINAL LIQUID CORE BINDER • DELCO CORE AND MOLD WASH

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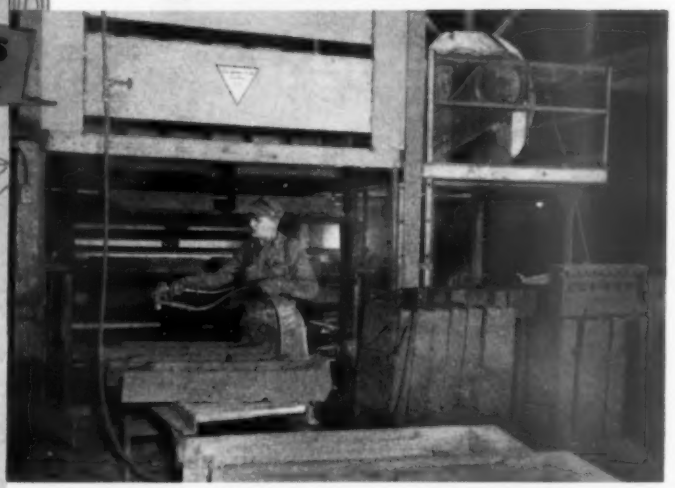
New DESPATCH Vertical Foundry Oven

Cuts Production Costs

Says MARATHON FOUNDRY

HERE'S WHY

High volume forced convection heating system with cross flow of heated air from heat duct through center of oven directs heat to every inch of the bake zone to permit accurate control of heat and air for proper preheating and baking of all cores. This assures more uniform baking, higher quality and fewer rejects. Up to 75% of heated air is recirculated which saves fuel. Balance is exhausted at top of oven carrying away objectionable fumes. Vertical oven construction saves floor space and arrangement of core racks on vertical conveyor subjects all cores to identical baking and cooling cycles. The oven is fired by a direct oil heater.



Cleaning cylinder head cores with an air blast after baking in a Despatch Vertical Oven at Marathon.

Loading cylinder head cores into a Despatch Vertical Core Oven at the Marathon Foundry.

Marathon Foundry and Machine Company of Wausau, Wisconsin, producers of Diesel cylinder heads and manifolds, report the following production achievements after installation of a DESPATCH VERTICAL CORE BAKING OVEN:

- **60% Increase in Production over previous method.**
- **30% Lower Maintenance Costs.**
- **Even Baking assuring higher quality cores.**
- **Notable Saving in Scrap because of better baking efficiency.**
- **Trouble-free Operation at all times.**

The Marathon Foundry uses about 35 tons of core sand daily and is now producing 525 cope and drag cylinder head body cores in a 16-hour day. They attribute this fine production record to the efficient, economical and labor-saving operation of their Despatch Oven installation.

DESPATCH FEATURES ASSURE FAST, UNIFORM CORE BAKING AT LOWER COST

INCREASED PRODUCTION! 100% convection heat and up to 75% recirculated air give you speedy warm-up, fast heat recovery after re-loading and fast baking.

QUALITY BAKING! Heavy-duty, hi-volume fans give speedy heat transfer, assure uniform baking. Equipped with automatic temperature controls and fire underwriters' approved safety system

EFFICIENT OPERATION! DESPATCH direct gas or oil fired heaters cut fuel costs . . . ease of loading saves time and labor . . . compactness saves floor space.

WRITE TODAY for Bulletin 30 or request a representative to call.

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DESPATCH OVEN COMPANY

(*Continued from page* 144)

sign, according to Mr. Howarth. Sprues between gates should be approximately twice the width of the gate, with a minimum of turbulence a main objective. A perfect gating system alone will not produce good castings, and Mr. Howarth suggested other factors which must be considered for control with integration of practice. Once the gating, sprue and risering plan is completed, weight calculation is made in the laboratory. A pouring basin has advantages in that guesswork is removed from pouring velocity, and sprue and gates must be of sufficient size to handle material in the approximate time required.

C. A. Robeck, Gibson & Kirk Co., Baltimore, Md., at the second bronze and light alloys session, presented a paper on "Nonferrous Foundry Practice." Technical chairman was Earl Bush, master molder, U. S. Naval Gun Factory, Washington.

Mr. Robeck detailed suggested practices in all foundry departments, emphasizing the point that good practice begets good castings. Among the good practices advocated by Mr. Robeck was the keeping of records on foundry procedures and using those records as a guide in daily operation. The speaker urged care in changing sources of supply for raw materials, due to possible variations in analysis. He also recommended that, while proper materials should be obtained, specifications should not be so tight as to complicate the supply problem.

In a subsequent discussion of gas difficulties, it was pointed out that three instruments are available for indicating CO, O and CO_2 in furnace atmospheres. One member commented that talk about maintaining an oxidizing atmosphere in the furnace is beside the point. He cited foundries making good castings with metal melted in a reducing atmosphere. From this he concluded that it is foundry practice that makes for good castings. Foundry practice can be adjusted to compensate for all types of conditions.

At the concluding bronze and light metals session, C. M. Lambe, assistant sales manager, Industrial Gypsum, Lime and Paper Division, U. S. Gypsum Co., Chicago, presented a paper entitled, "Present Status of Nonferrous Casting in Plaster Composition Molds." B. A. Miller, foundry superintendent, Baldwin Locomotive Works, Eddystone, Pa., was technical chairman.

Mr. Lambe covered the historical developments of nonferrous casting in plaster composition molds. He outlined important fundamentals in the use of plaster as a foundry material, touching briefly on the basic problems involved in casting nonferrous metals in plaster molds. He emphasized that proper control is important. Every effort should be made to standardize all steps in the operation, and departures from past experience should be scrutinized carefully. He

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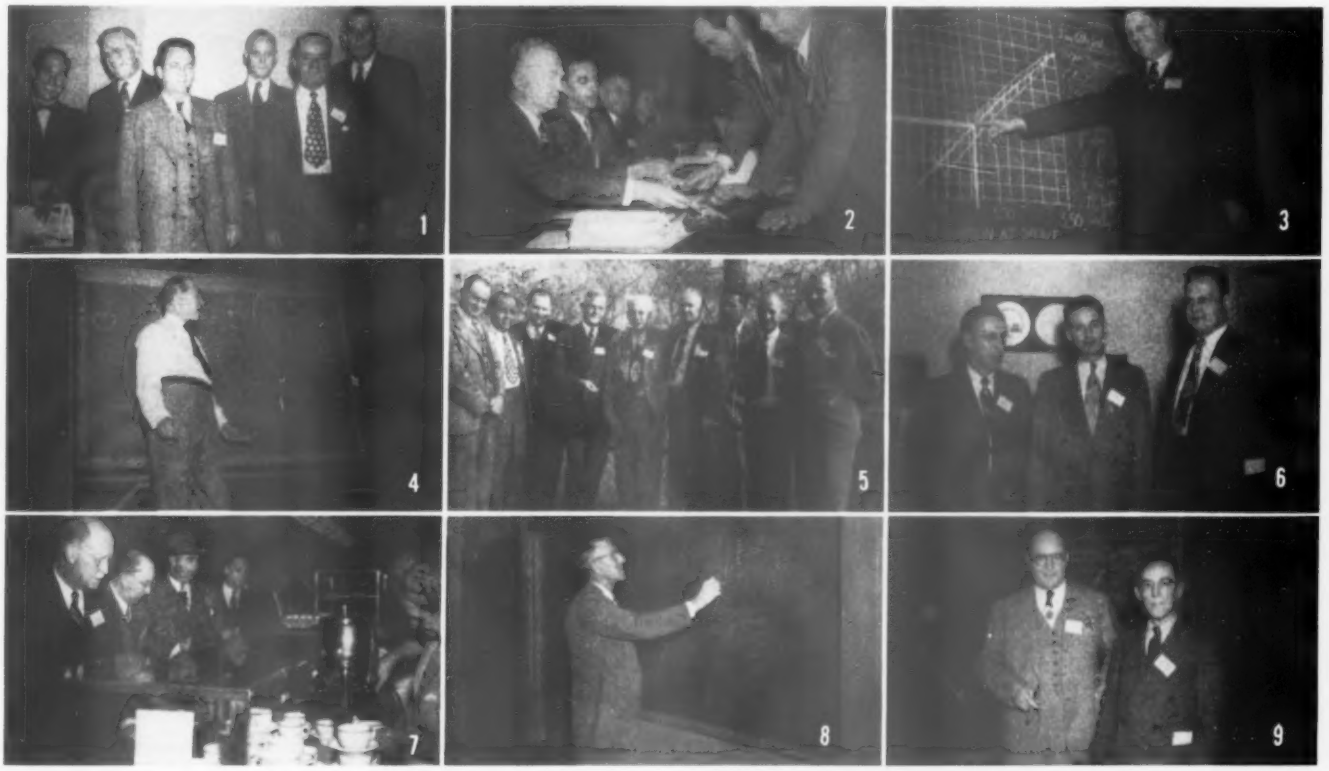
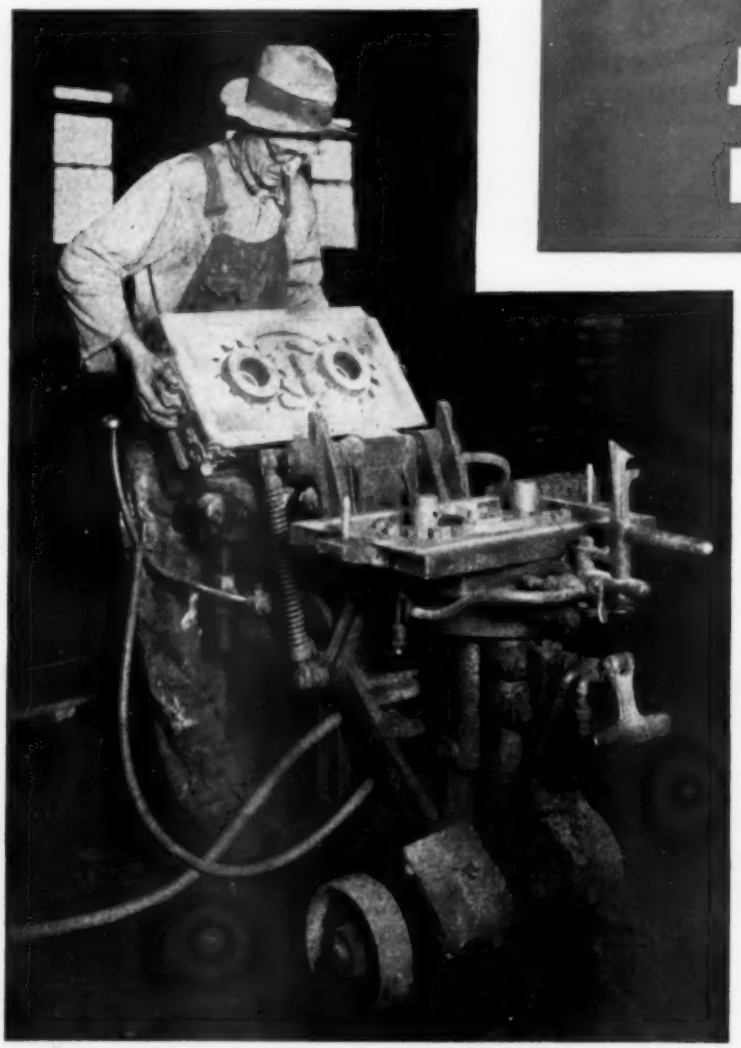
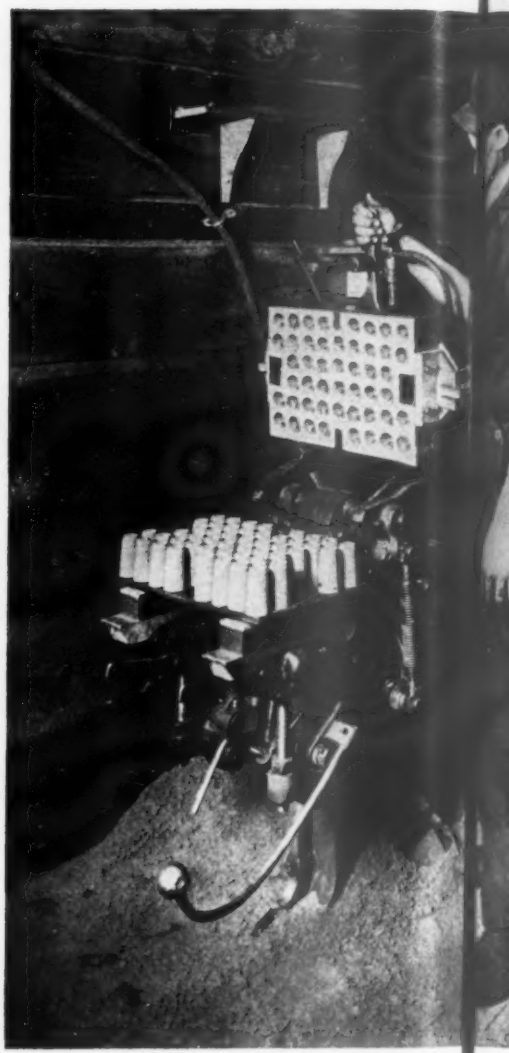


CONFERENCE VIEWS at Stevens Institute of Technology. Shown, left to right, are: Fig. 1—Dr. Alfred Bornemann, Stevens Institute; E. W. Horlebein, national AFS president; J. B. Mentzer, Chesapeake Chapter chairman; Thomas L. Wood, Metropolitan Chapter chairman; Harold L. Ullrich, conference chairman, and Dr. Harvey N. Davis, president, Stevens Institute. Fig. 2—Registration table. Fig. 3—Frederick W. Hanson, Electro-Metallurgical Division, New York. Fig. 4—Harry Kessler, Sorbo-Mat Process Engineers, St. Louis. Fig. 5—After-lunch conversation group. Fig. 6—Harry Exley, Warren Pipe Co., Everett, Mass.; W. A. Mehner, Cleveland Flux Co., and Stanley Zanzites, Warren Pipe Co. Fig. 7—Luncheon group at the Stevens cafeteria. Fig. 8—A. J. Howarth, Bendix Aviation Corp., Teterboro, N. J. Fig. 9—Joseph A. Gitzen, Delta Oil Products Co., Milwaukee, and George F. Watson, American Brake Shoe Co., Mahwah, N. J. Photos by John Bing, Metropolitan Refractories Corp.

INTERNATIONAL TYPE R

Jolt Ram · H
Hand or Foo





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The overall construction and design of the International RJ makes for convenient operation.

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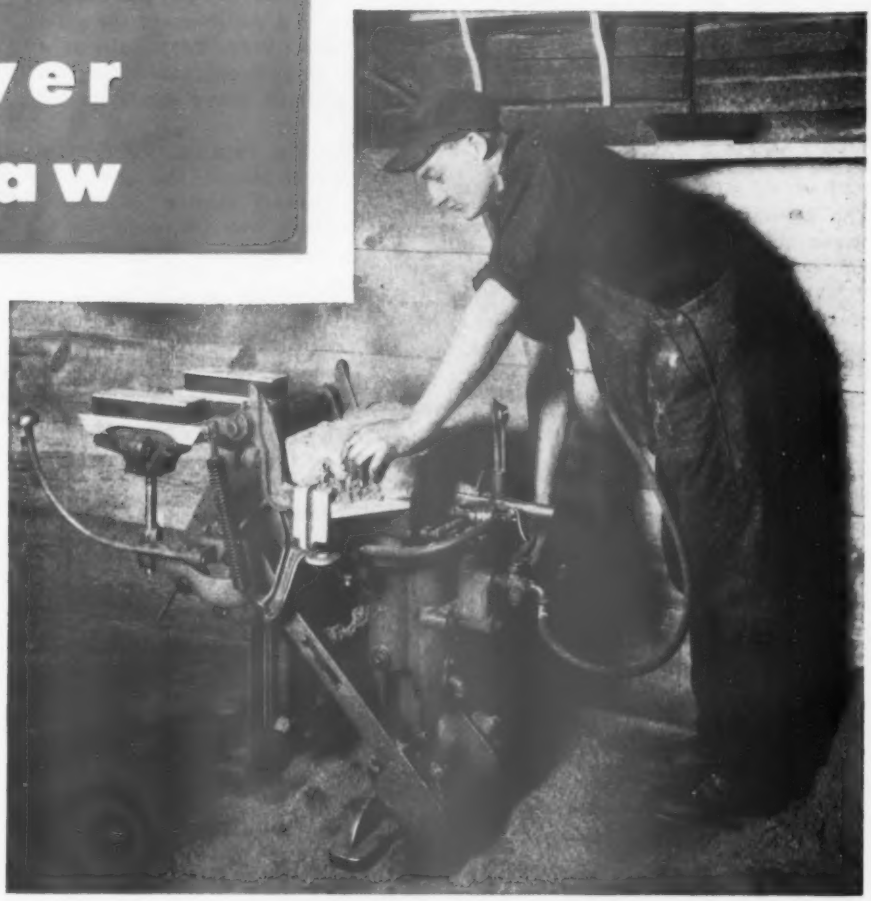
LA GRANGE

RJ MOLDING MACHINE

Hand Turnover
Lever Draw



- Inquiries should specify outside width and length of the largest flask or core box to be handled and amount of draw required.
- The International **TYPE RJ** is designed, as are all of the machines in the line, by experienced foundry engineers who have a practical working knowledge of the problems of the business.
- The RJ is used extensively for cores.

TYPE AND 1400 DIFFERENT SIZES IN THE INTERNATIONAL LINE

MACHINE COMPANY

PARK, ILLINOIS

(*Concluded from page* 147)

concluded by discussing recent advances in metal casting in plaster compositions. These include development in design and the use of highly permeable plaster compositions.

E. C. Troy, field engineer for National Engineering Co., Palmyra, N. J., conducted the steel round-table discussion on "Gating and Risering." A number of problems relating to steel foundry practice were discussed.

The second steel session featured a paper on "Microstructure and Mechanical Properties of Cast Steels" by Malcolm F. Hawkes, associate professor, Carnegie Institute of Technology, Pittsburgh, with C. B. Jenni, metallurgist, General Steel Castings Corp., Eddystone, Pa., as technical chairman.

Temperature Is Important

Mr. Hawkes stated that the fundamental variable controlling microstructure of cast steel is the temperature at which austenite transforms on cooling. As this temperature is lowered by increased cooling rate or hardenability, structures successively observed are: Dendritic blocky ferrite plus pearlite, random blocky ferrite plus plearlite, Widmanstatten ferrite plus pearlite, and martensite. Microstructures of a large number of plain carbon, low and medium alloy cast steels were studied after various annealing and normalizing treatments at Carnegie Tech through research supported by the Steel Founders' Society of America.

Because transformation on cooling extends over a range of temperatures, mixed structures are usually noted. Another important factor causing mixed structures is dendritic segregation of alloying elements. Relative severity of segregation cannot be inferred by comparing single conventional photomicrographs of two cast steels cooled in a similar manner.

Many cast steels of about the same strength show wide variation in microstructure and lack good correlation with mechanical properties. Porosity, inclusion type, steelmaking variables, and gases are equally important factors. Successively better ratios of ductility to strength in any one cast steel are obtained by faster cooling. Slight, if any, loss in ductility and appreciable gain in strength are obtained by moderately rapid cooling, instead of slow cooling; the latter producing blocky ferrite.

Howard Taylor, Massachusetts Institute of Technology, Cambridge, Mass., in his paper on "Steel Foundry Sands and Their Relation to Casting Defects" at the concluding steel session, stated that too many foundries are attempting to produce fine steel castings with used sand. Foundrymen should know their sand grain sizes, both ferrous and nonferrous sands, and also composition as to silica and other elements. Control of the basic sand at all times is a requirement for good surface finish. Prof. Taylor urged a minimum of different sands for different uses with fewer sands for all purposes.

The AFS film entitled "Fluid Flow in Transparent Molds" was shown at the first general session on Saturday. Narration was delivered by L. W. Eastwood, Battelle Memorial Institute, Columbus, O. William A. Morley, manager, Olney Foundry Division, Link-Belt Co., Philadelphia, was technical chairman.

At the concluding session, with Harold L. Ullrich, works manager, Sacks-Barlow Foundries Inc., Newark, N. J., as technical chairman, W. C. Mearns, development and research division, International Nickel Co., New York, discussed "Ductile Cast Iron."

In his address, Mr. Mearns stated that ductile cast iron has the same properties as gray cast iron except that ductility is improved. Tensile strength of ductile iron drops some with increase in section size, both before and after annealing, although yield strength is unaffected by section size after annealing. He went on to say that maximum strength may be obtained only when the phosphorus content of the iron is kept below 0.20 per cent.

Other properties of ductile iron include less damping ability than gray iron and better machinability. According to Mr. Mearns, ductile iron has no tendency to tear during machining. Its fluidity is about the same as gray iron, but shrinkage is greater, and it has a tendency toward piping. Proper feeding is important. He showed slides depicting the iron structure and typical ductile iron castings.

Offers Slide Chart

Air Reduction Sales Co., 60 East 42nd St., New York 17, has reprinted its oxyacetylene machine gas cutting slide-chart, introduced about three years ago. The chart covers two of the company's most widely used cutting tips. By sliding the chart to the indicated tip number, oxygen and acetylene pressures, speed in inches per minute, gas consumption and approximate width of kerf are read down one column. Cleaning drill sizes also are indicated.

The chart measures 2¾ x 7 in. and can be carried in shop coat or overall pocket.

OBITUARY

GEORGE G. JONES, 79, Cleveland Negro inventor, died at his home there Nov. 3. Mr. Jones, who lived in Cleveland all of his life, began working in a brass foundry there at the age of 16. In 1905 he founded the Favorite Brass Foundry which he operated until his retirement in 1934. Among various mechanical devices he invented a trolley wheel, which the Cleveland Electric Railway Co. put into universal use in 1908 and soon after was used all over the country. In his foundry he also cast brass images and art pieces, the most notable of which was a bust of Booker T. Washington, which brought him national renown.

* * *

Crispin Oglebay, 73, chairman of the board of directors, Oglebay, Norton & Co., Cleveland, died Oct. 23. Mr. Oglebay was graduated from Yale University in 1900, and joined Hoffman Hinge & Foundry Co., Cleveland, three years later. When it became known as Ferro Machine & Foundry Co. in 1906, he was named president. Fourteen years later he was elected chairman of the board, resigning in 1946. In 1924 he was named president, Oglebay, Norton & Co., operators of iron ore properties, Great Lakes vessels and lakes dock facilities.

* * *

Walter J. Frost, 83, founder of Frost Co., Kenosha, Wis., in 1902, died Oct. 3. Mr. Frost, who was president-treasurer of the metal parts company for 35 years, was chairman of its board of directors when he died.

* * *

Oscar W. Swangren, president, Dorchester Brass & Aluminum Co., Hyde Park, Mass., died there suddenly Oct. 25. Mr. Swangren, one of the first members of the Non-Ferrous Founders' Society, served as one of its directors for 5 years.

* * *

John H. Brown, 35, personnel manager and a director, Brown-Boggs Foundry & Machine Co. Ltd., Hamilton, Ont., died Oct. 9.

* * *

Clifford J. Miller, 43, industrial engineer, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., died Oct. 15.

* * *

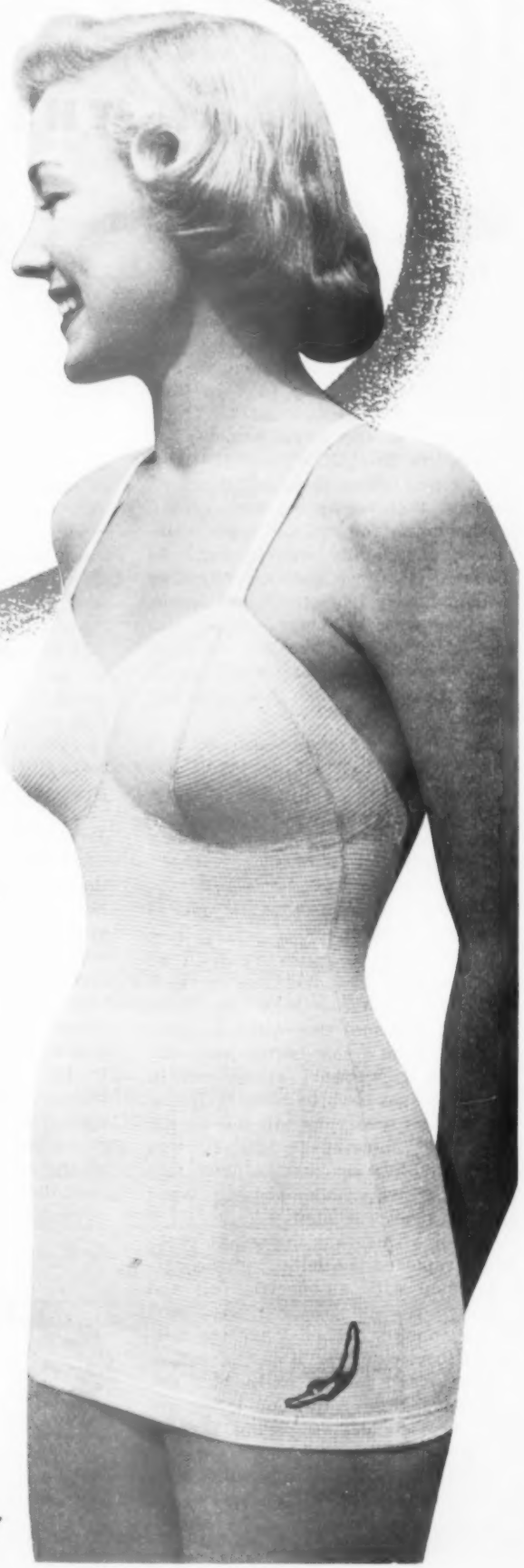
B. A. Patch Jr., 50, Chicago district manager of the Ohio Ferro-Alloys Co., Canton, O., died Oct. 17.

Don't Overlook..

these

ANNEALSHOT

features:



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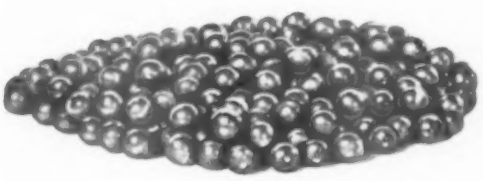


ANNEALSHOT

by *Metal Blast*

Man-to-Man

ON THE MOLDER'S BENCH

"Sign Language in the Foundry"

By RALPH L. LEE

IT used to be when I went up into my hobby foundry to do a little work, the darned old telephone bell down at the house would start ringing for me. It seemed to know what I was trying to do. If it wasn't ringing then someone was calling at the house for me, or some member of the family wanted me. So to save steps we put an extension in the foundry from the house phone, together with a buzzer system and one of those loud-speaker arrangements for talking back and forth. I got this inter-com cheap, second hand.

But if the air compressor took it into its head to start up, while my Goldberg power riddle was shaking the building along with the sand, to say nothing of the tumbler tumbling and the vibrator vibrating, I couldn't hear either the telephone bell, the buzzer, the loud-speaker or all of them put together.

After trying to raise me with all these devices, including one of those old-fashioned farm bells we have hanging outside the kitchen door, Mother, (that's my better half, my home superintendent) every once in a while would have to come traipsing up to the foundry to tap me on the shoulder. Sometimes this tap was somewhat heavier than a love tap, especially when she had to wade through deep wet snow.

To solve this very important problem I replaced the buzzer in the pattern shop with an electric bell and mounted it right in the noisest part of the foundry. Then I had the telephone company, for a consideration, come up and put an extra king-size bell along side of the one I had put up. There wasn't anything I could do to step up the loud-speaker.

But, in spite of all this rigamarole, I'll be doggoned if Mother hasn't had to come up and get me several times here lately. About the only thing left for me to do now, I guess, is to rig me up an air whistle, or an electrically operated shot gun.

I realize, of course, that all this is old stuff to foundry folks. Most of them have gotten so used to noise over the years, I expect that silence must hurt their ears. Foundry noise must be just like the smell of paint to a painter or heights to a steeplejack, part and parcel of the trade. I know, for myself, even as an amateur that when I'm up there working on an interesting job I forget all about noise. But on the other hand I do know this, that if a visitor tries to talk to me when all these noises come together, I have to take my choice; either I don't pay any attention to what he is saying, or I shut down the job.

On my many foundry visits I notice that foundry folks have had to invent sort of a special communication system, made up of close range, mouth-to-ear shouts and deaf-and-dumb hand motions. It's amazing how much they seem to get across to each other this way. So far though, I haven't been able to get on to it. In fact, I have definitely given up trying to carry on a conversation with my guide in certain parts of the foundry. I just make mental notes of the questions I want to ask and save them up till we get back to the office.

Many a time after we get to the office, I can't help but think of the production boys who don't get much chance to talk shop with responsible people, that is shop talk from their point of view—and when you get right down to it who doesn't have a viewpoint. I know, for myself, with my love for both the foundry and for conversation I don't believe I could carry on without a chance once in a while for a gab fest.

Then too, getting out of the foundry for a moment and on to my own bread and butter work, I know there are times when something happens to me on the job that I don't quite understand. It may look like a slight of some kind, maybe it has all the earmarks of a down-right injustice. It may be a suspicion that someone has been giving me the old run-around.

When a thing like this happens, you bet your sweet life I get to the bottom of the matter in short order. In nine cases out of ten I find that my suspicions were absolutely unfounded, I had misunderstood what I had seen or heard, or I had been deliberately mislead by someone with an axe to grind.

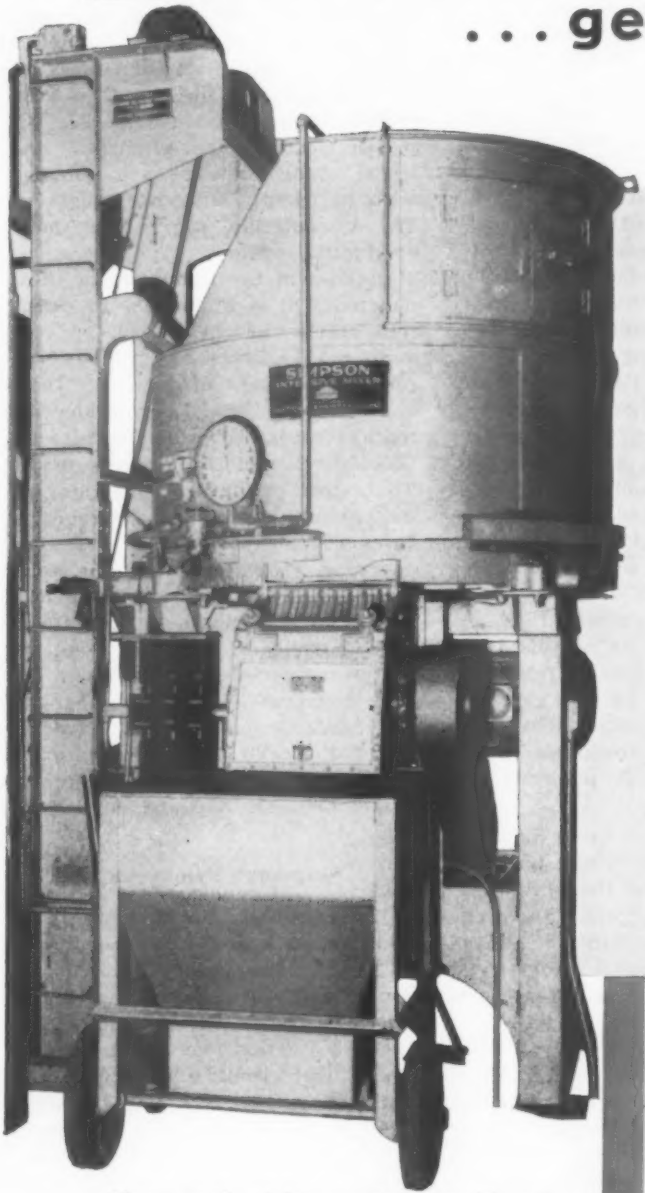
Then here's another thing. When I know that I am really doing a good job and have been for quite a stretch, if no one says anything about it I get down in the dumps. If this should go on for too long a time I doubt whether I would care to stick with the ship. While there might be some people who could be perfectly content tending a lighthouse month in and month out without ever talking to anyone, I think that most people would be like me, they'd go nuts.

As far as I can see, the foundry business teaches you that there is always some way out of a problem if you look hard enough and long

(*Concluded on page* 154)

Before you buy any Mixer...

...get the answers to these QUESTIONS:



- **What is the *actual* batch size in *pounds* that the mixer will handle on a daily production basis without overloading?**
- **How many tons of *properly prepared* sand will the mixer produce per hour, per day?**
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UNDER today's conditions, the answers to these important questions are more vital to *efficient* and *profitable* foundry operation than ever before. When you use SIMPSON Intensive Mixers, you'll find that the answers are on the *plus* side . . . with more productive capacity, lower initial cost, and less operating cost . . . based on actual operating data secured on the job in hundreds of foundries all over the country.

Shown at the right are actual capacities of some Simpson Mixer models. For more complete data, ask to have a National Engineer present additional facts and figures. Call or write today.

POUNDS PER HOUR OF PROPERLY PREPARED SAND WITH SIMPSON INTENSIVE MIXERS

SIMPSON MIXER MODEL	MAX. HORSE-POWER	BATCH SIZE IN POUNDS	2 MINUTE CYCLE	3 MINUTE CYCLE
No. 2	20	1,500	45,000	30,000
No. 3	50	3,000	90,000	60,000

Complete details on capacities of other Simpson Mixer models will be furnished on request

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(*Concluded from page* 152)
enough for it. If you can't put a riser here, you can try a chill; if green sand doesn't seem to work we might try a core.

I don't think there can be any question that unavoidable noise in the foundry tends to separate our employees from us. Since it is almost impossible to chew the fat most of the time, it's pretty hard to get our viewpoint over to the boys or for them to get their viewpoint over to us. And it might well be that this wall of noise on the job might make it easier for outsiders to get their viewpoint over to our folks off the job.

It might not be a bad idea to take a good look at the whole operation from the standpoint of noise. Knowing that noise cannot be separated from many of our jobs, maybe there is some way to coop up the worst offenders—that is, try to shut out the noise some other department is making from mixing up with the noise our department is making. But even after we have gone as far as we can in this direction we might try setting up some listening and talking posts, fairly sound-proofed cubbyholes, as comfortable as we can make them where the boys can come one at a time and talk shop. In a place like this the boss and Tony might take the weight off their feet for a while, carry on a little game of two-sided conversational ping-pong, maybe a bit of bragging, griping, gossiping, and now and then a touch of table pounding.

Of course, there might be other ways of tackling this problem. We might issue hearing aids like we do goggles, or we might consider learning the deaf and dumb language or improving the foundry sign language we already have. On the other hand, the listening and talking posts might be the best bet, provided we use them and keep on using them regularly with everyone in the place taking part in the program from the new sweeper to the big boss himself. I have a feeling that it will be a good idea to think about it anyway.

ASTM Year Book

American Society for Testing Materials, 1916 Race St., Philadelphia 3, has issued a new edition of its *Year Book* as of September, 1949. The book containing 566 pages lists the officers, members of district councils, members of the society, personnel of the numerous technical committees, and various other phases pertaining to the society and its functions which spread over a wide field.

Segregation
In Small Steel Castings

(*Continued from page* 77)
decreases, the amount of segregation also decreases. In the 1-in.-thick castings which were fed through ½-in.-long necks, no appreciable segregation occurred at any contact diameter.

Centerline Segregation — Several trends can be observed from the photographs of the various series of castings discussed heretofore. When the neck diameters are too small, gross shrinkage occurs within the castings due to rapid freezing of the neck. With larger neck diameters, gross shrinkage and segregation exist together. As the neck diameters are enlarged still more, gross shrinkage disappears and pronounced segregation is present. And finally, with sufficiently large neck diameters and small neck heights, segregation also disappears. This is in accordance with the evidence presented previously—that segregation of this type occurs between the two extremes of feeding conditions. At one extreme gross shrinkage is produced by "underfeeding," and at the other sound homegeneous metal is produced by "overfeeding."

Another observation to be made is that the segregated areas tend to assume the shape of the shrinkage cavities which would form if the neck diameter were reduced. In the chunky castings—such as the 4-in.-diam, 4-in.-high castings—the shrinkage and segregated areas tend to be of a globular shape, while in the 7-in.-long cylinders the shrinkage voids and the segregated areas are elongated. Where the riser must feed an appreciable distance in narrow sections—such as in the 10-in.-long, 2½-in.-diam castings—some of the shrinkage tends to be of the V-shaped centerline type, and the segregate also assumes this pattern.

Segregation in these long castings must be considered as a different manifestation of the same type of segregation as found in the other casting shapes. In the former, much of the segregation occurs independent of the riser neck; it arises from the narrow shape of the casting and the long range of feeding required of its riser. The gross segregation immediately below the riser necks is caused by the restricted neck, but the "chevron-like" segregate along the centerline of the casting occurs even though the riser contact covers the entire top of the casting, as it does in the right-hand casting as shown in Fig. 30.

The castings in Figs. 28 and 30 all contain gross shrinkage because bottom-gating of long narrow castings of this type causes adverse temperature gradients to form within the castings—to the extent that complete feeding is impossible regardless of the size of riser used. When such castings are top-gated as in Fig. 32, proper temperature gradients, and hence sound castings, are obtained with sufficiently large riser contacts. The V centerline segregation, however, still persists.

Because of the small size of these chevrons, it is impossible to determine their carbon content by conventional analyses of drillings. A photomicrograph of one of these chevrons (Fig. 33), however, shows a marked difference in carbon between the chevron and the adjacent metal. The extent of segregation is also indicated by hardness measurements. In a casting containing centerline chevrons, it was found that the metal midway between the edge and center had a uniform hardness of 4 Rockwell C, while the hardness along the centerline varied considerably. The dark "chevron" areas of segregation had hardness values ranging from 8 to 17 Rockwell C, while the areas between the segregates had hardness values between —10 and 4 Rockwell C.

Skrinkage Points Away

The V segregation appears to be analogous to that found under knock-off risers. To account for it on the same basis as the segregation under knock-off risers would require that there be periodic bridging of dendrites, which would allow only higher-carbon liquid to flow into the areas isolated by the dendritic bridges.

Brinson and Duma observed (*Transactions*, AFS, Vol. 50, 657-765, 1942) that V centerline shrinkage voids always point away from the riser. To show the similarity between centerline shrinkage and centerline segregation, castings were made which were 10 in. long, 2½ in. in diameter at one end, 3 in. in diameter at the other, and fed by full-contact risers 5 in. in diameter (Fig. 34). As can be seen, V-centerline zones of segregation also always point away from the riser regardless of surface taper, gate locations or position of the casting. In the top-risered castings the chevrons all point downward, while in the castings fed with the bottom riser they point upward. The chevrons in the casting molded in the

(*Concluded on page* 156)

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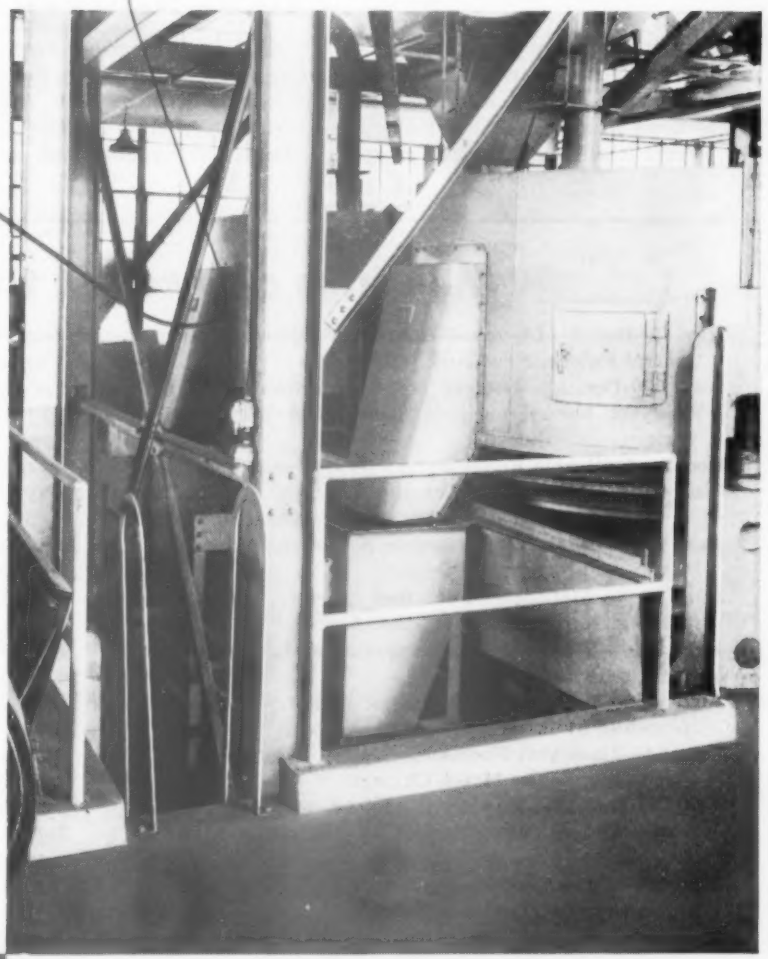

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CLEARFIELD MACHINE COMPANY

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(*Concluded from page* 154)
horizontal position also point away from the riser.

In their studies, Brinson and Duma found that favorable temperature gradients would eliminate centerline shrinkage. Thus, still more favorable temperature gradients should eliminate centerline segregation. To confirm this, a series of castings was made in which the taper was progressively increased, and the results are shown in Fig. 35. The castings were fed by 5-in.-diam top risers. As the taper is first added to the casting, shrinkage is eliminated but chevrons of segregate are present. With still more taper, segregation also disappears.

Summary and Conclusions—Segregation of carbon and also the other alloying elements occurs in steel castings near the riser contacts when the contact is small. Castings fed by knock-off risers are particularly susceptible to this type of segregation.

It is concluded that, during the latter stages of solidification, a lattice work of low-carbon dendrites surrounded with high-carbon liquid exists in the riser contact while the casting still requires feed metal. To satisfy the feed demand of the casting, the high-carbon interdendritic metal flows into the casting to form the segregated zone. If still more feed metal is required in the casting, it may be obtained from the riser through the dendritic network of the contact.

Carbon segregation beneath knock-off riser contacts can be minimized by: (1) increasing the neck diameter, (2) decreasing the neck height, and (3) using exothermic material to make the knock-off riser cores.

This form of carbon segregation is more severe in chunky, massive sections than in long, slender sections. This segregation is not removed by commercial annealing treatments.

Centerline segregation, resembling the V-shaped segregation in ingots, occurs in cast sections which are long and slender. This type of segregation is closely related to centerline shrinkage and does not depend on a reduction in section at the riser contact.

Centerline segregation can be eliminated by increasing the taper on the sections so that more complete feeding is possible.

WisconsinConference To Be Held Feb. 9-10

Annual Wisconsin Foundry Conference will be held at the Schroeder Hotel, Milwaukee, Feb. 9-10, it has been announced by the Wisconsin Chapter, AFS, which will sponsor the event in conjunction with the University of Wisconsin. The two-day affair, which in past years has attracted the largest attendance of any of the various regional foundry conferences held throughout the country, will include 24 technical sessions devoted to gray iron, steel, malleable iron, nonferrous, pattern and technical subjects. In addition, two luncheon meetings and a dinner are scheduled.

British Select Team To Advise Foundries

The British Cast Iron Research Association and the Council of Ironfoundry Associations, in conjunction with the Joint Iron Council, are setting up a team of suitably experienced men to perform an advisory service for the industry. The team will be available to visit any foundry by invitation, and confidential reports will be made to the managements on any steps that may be needed to improve performance in relation to quality, output, cost or the best use of manpower.

This advisory service will supplement the efforts of the mutual aid groups which already have been set up co-operatively by some employers' associations in the ironfounding industry.

Meetings of Interest to Foundrymen

Nov. 28-Dec. 3—Chemical Industries exposition, Grand Central Palace, New York

Nov. 30-Dec. 2—Society for Experimental Stress Analysis, annual meeting, Hotel New Yorker, New York

Dec. 9—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

1950

Jan. 16-19—Plant Maintenance Show and Conference, Public Auditorium, Cleveland

Jan. 20 — Malleable Founders' Society, semiannual meeting, Hotel Cleveland, Cleveland

Feb. 9-10—Wisconsin Foundry Conference, Schroeder Hotel, Milwaukee

Feb. 9-10—Birmingham Regional Foundry Conference, sponsored by Birmingham AFS chapter

Feb. 24—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Feb. 27-Mar. 3—American Society for Testing Materials annual committee week, William Penn Hotel, Pittsburgh

Mar. 3—Malleable Founders' Society, eastern sectional meeting, Commodore Hotel, New York

Mar. 10-11 — Ohio Regional Conference, Cincinnati, sponsored by Ohio AFS Chapters and University of Cincinnati.

Mar. 21-22—Steel Founders' Society of America, annual meeting, Edgewater Beach Hotel, Chicago

Mar. 24—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Apr. 4-8—Chicago Technical Societies Council, national production exposition, Stevens Hotel, Chicago

Apr. 28—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

May 8-12—American Foundrymen's Society, annual convention and exhibition, Cleveland

May 19—Malleable Founders' Society, eastern sectional meeting, Commodore Hotel, New York

May 26—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

June 1-3—Electric Metal Makers Guild, annual meeting, Shawnee Hotel, Springfield, O.

June 22-23—Malleable Founders' Society, annual meeting, The Homestead, Hot Springs, Va.

June 26-30—American Society for Testing Materials, annual meeting and exhibition, Haddon Hall, Atlantic City, N. J.

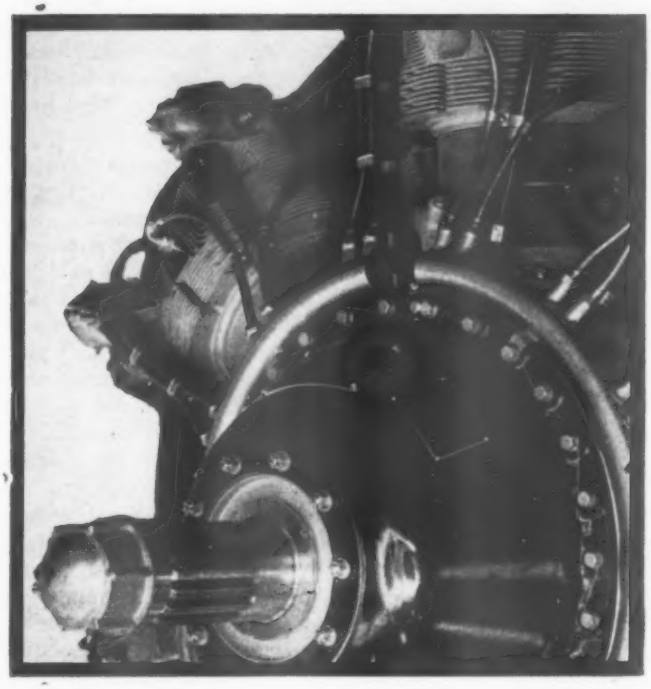
July 28—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Oct. 12-13—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

Oct. 19-20—Gray Iron Founders' Society, annual meeting, Netherland Plaza Hotel, Cincinnati

Nov. 8-10 — National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago

SOFFELITE ALUMINUM FLUXES



Many of the intricate aluminum castings that go into motors, cylinder blocks and pressure castings are made with the aid of SOFFELITE ALUMINUM PURIFYING FLUX because SOFFELITE will produce a tougher, cleaner, denser metal with less shrinkage and more fluidity, free from aluminum oxide and iron. Leakers are greatly reduced—in one instance from 67% to 1% in both permanent mold and sand castings.

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An all around Flux for aluminum castings —reduces aluminum oxide and iron. Produces metal with higher tensile strength, greater elongation and better machinability for both sand and die castings. Never fails to stop leakers.

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Special cleaning and refining Flux for open flame and iron pot melting. A powerful solvent for reducing heavy metal losses through skimmings. Removes aluminum oxide and gas—increases fluidity.

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By ARTHUR H. ALLEN
Detroit Editor
THE FOUNDRY

AROUND Detroit

New Ford production foundry is possibility as part of decentralizing trend . . . Steel and coal strikes postpone resumption of heavy production of motor cars until January, following model changeovers

THINGS are looking brighter for a large new production foundry to supply casting requirements of Ford-Mercury-Lincoln cars and trucks, but it is not expected to be located at the Rouge plant here or even in this area. Although several million dollars have been dumped into the present production foundry during recent years, it has been recognized that the facilities simply have been outgrown and the best thing to do was to start all over from scratch. Now, so the report goes, an appropriation has been approved for the project by the company's top policy committee, to be spread over a three-year period, resulting in accelerated activity among engineers and planning experts.

A number of locations have been inspected as possible sites for the future foundry, including plants already erected which might be purchased and converted, and industrial real estate suited to the project. One plant said to have been looked over carefully was the war-built foundry of General Steel Castings Co. in Illinois, now idle.

Ford's policy of decentralizing operations away from the Rouge is working out the way it was promised when the "new team" took over the management reins after the war. The foundry project is just the latest sample of the trend. Already in production are a gear and axle plant on Mound road northeast of Detroit, formerly a naval arsenal erected during the war; and a forging plant in Canton, O., where some unusual forging operations are involved on ring gears, wheel spindles and related parts.

Recently a plant was acquired from Kelsey-Hayes Wheel Co. at Monroe, Mich., which is slated to become headquarters for all Ford die casting work, including the aluminum torque converter element of the automatic transmission which Ford and Borg-Warner are tooling to build jointly on a 50-50 basis. The casting is complicated, with radial vanes or curved shape, and coring it is no cinch. It may be found necessary to switch to a semipermanent mold casting, in which sand cores are positioned. The latter method now is being used by Buick for the production of a similar aluminum casting.

Another early prospect on the Ford list is a plant to manufacture and assemble the complete transmission. Already equipment people are being consulted about machinery requirements, delivery dates being set for next March to permit the first transmissions to be available by summer. A plant site has been selected at Cincinnati.

* * *

STEEL and coal strikes have taken their toll on auto-building, as everyone expected they would sooner or later. General Motors divisions, for example, were planning to run out their inventory of steel and then shut down. Some changeovers to 1950 models have been made by using up what steel remained after running out the 1949 schedules. This permitted a bare sampling of dealers who will be in position to take orders but to make few deliveries. Pontiac planned to close Nov. 23, with the possibility of reopening on Dec. 15 provided steel shipments were resumed in reasonable volume by that time. Whatever the outcome, however, December will be a slow month throughout the motor industry and full steam cannot be applied to production until January.

One plant announced a November shutdown to its employees and suggested that if they were wise they would defer their deer-hunting plans until that time, rather than taking off for the woods while it was still possible to stay on the job for a week or ten days more.

Ford was able to avoid a complete shutdown by virtue of the fact it makes 50 per cent of its own steel, a lot of which can be routed to suppliers who are short. Ford switched to 1950 models early last month. Engine improvements include the use of a new molded camshaft timing gear of laminated cloth impregnated with bakelite resins to replace a cast aluminum gear, in the interests of noise reduction; autothermic pistons in which a steel strut is cast into the aluminum piston to control expansion; three-blade fan with narrower belts; redesigned camshaft with longer opening closing ramps on cams, and a few minor changes to improve oil economy. Body styling is virtually unchanged from the 1949 series, major retooling apparently being deferred until next year as expected. Many companies now follow the practice of running two years on the same body dies, to conserve on tooling costs.

A major tooling program is under way at Kaiser-Frazer, after a $44 million transfusion from the RFC. An entirely new low-priced car is in the works, most of the body dies being furnished by Budd in Philadelphia and fenders, hoods, etc., originating in Detroit. The car will be of standard dimensions but will be priced below anything now in the low-priced field; how much remains to be seen. Power plant will involve a new 6-cylinder engine, overhead-valve high-compression type, and Wilson Foundry in Pontiac is understood to have many of the patterns on hand for the basic castings requirements. The K-F engine plant in Detroit was closed early in November, as were most operations at Willow Run, pending disposal of finished car stocks.

* * *

BACK from a three-year stint in Australia, where he supervised the erection and staffing of a new gray iron foundry for General Motors Holden's Ltd. at Melbourne, is H. G. McMurry who, prior to his assignment "down under" was associated for 19 years with all departments of the Buick foundry at Flint, Mich. He is

(*Concluded on page* 160)

Foundry Conveying is a *Rough Game*

FOUNDRY CONVEYERS must be designed and built to operate under severe service. Gravity and power conveyers to be applied in this industry should have extra weight and strength built into them if they are to stay on the job. Because Mathews Engineers know foundry conveying problems, Mathews Conveyers are found in most of the great brass, steel and gray iron foundries in the United States and Canada, operating under extremely rough conditions, with a minimum of costly maintenance attention.

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(*Concluded from page* 158)
now assistant superintendent at the Pontiac foundry.

He has a vast store of experiences to relate of his Australian venture and of the difficulties involved in building and equipping the Holden foundry. It furnishes all castings required for the Holden automobile now being built there (orders booked for two solid years of production), numbering some 32 and including everything from cylinder blocks to water pumps.

The plant was built practically at sea level and necessitated some unusual foundation work. Two cupolas are available, one operated at a time, production being on the order of 40-50 tons per day. All castings are made on a single line and only one type of sand is used. The entire layout is unusually compact, although it embodies all the principles of the largest automotive gray iron foundries in the U. S. This process of "scaling down" a high-volume production foundry to the requirements of 85 cars a day, and of still retaining all the cost-saving features of American equipment while not being able to purchase the latter as such, was no simple job, not to mention the problem of recruiting suitable supervision and labor from the local area.

McMurry modestly speaks of the job as just a routine assignment, which it most certainly was not.

FIFTY years ago Anthony Smith started shoveling sand at the Enterprise Foundry Co., Detroit, which his father had organized two years earlier. Built on what was then farm land, the foundry numbered among its first customers a man named Henry Ford who was tinkering a few blocks away with a horseless carriage. The foundry grew with the motor industry and was swallowed up by the city of Detroit. Today it is a block-long plant, employing 100. Gray iron castings are supplied to the tool and die trade, an adding machine manufacturer and other smaller operators.

Recently Mr. Smith, who succeeded the late R. B. Carolin as president in 1940, joined with a couple dozen associates and friends to commemorate the golden anniversary of his start with the company. Of the group, 18 were veteran employees who boasted an average of 34 years with Enterprise. He recalled the early days of the foundry, when the going was a bit rough. "Times were so tight we couldn't charge a keg of nails or borrow a $200 payroll even though we had a going business. Ford bought a few castings from us, but apparently didn't have the money for more; and we were having too much trouble trying to meet our bills and payroll to extend credit."

He added: "Although we have been in business 52 years and have had a union contract since the day we started, we have never had a strike."

(Top)—Company directors, associates and friends gather to celebrate the 50th anniversary of President Anthony Smith of Enterprise Foundry Co., Detroit. (Below)—Mr. Smith accepts the plaudits of the guests, flanked by two of his directors, Dave Johnson (left) and A. B. Pfleiderer

Book Review

Treatise on Powder Metallurgy, Vol. 1, by Claus G. Goetzel, cloth, 778 pages, 6 x 9 in., published by Interscience Publishers Inc., New York. Price $15.

All available knowledge of powder metallurgy has been surveyed, digested and presented in a systematic way in this exhaustive treatise. Its aim is to serve as an introduction into the field for the novice who wants detailed information, as a reference book for the initiated, and as a source of stimulation for the inventor and engineer.

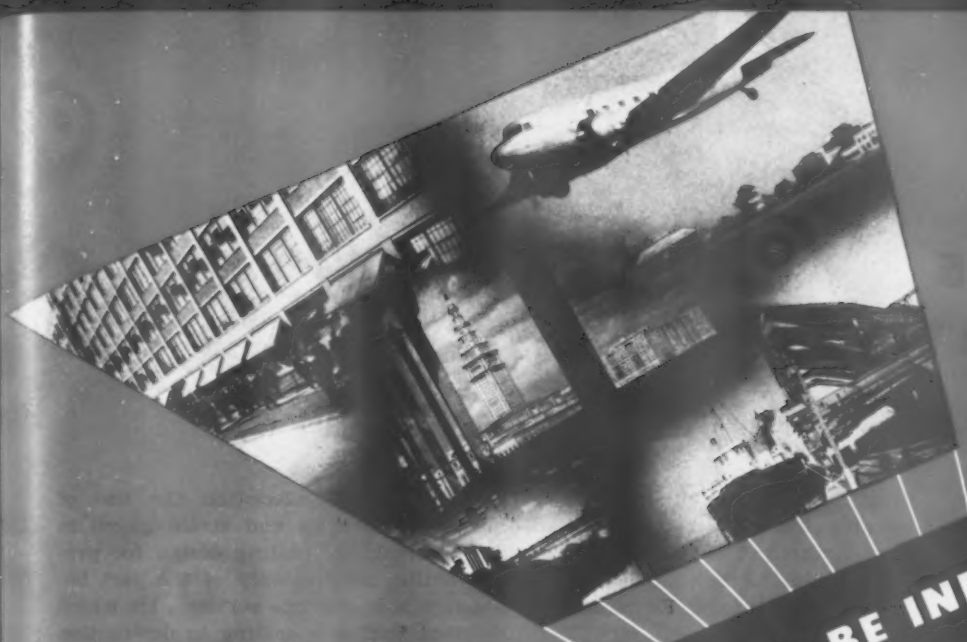
The treatise is printed in three separate volumes. Volume I deals with the technology of powder metallurgy processes, including a brief description of the underlying principles and a historical review. The production, properties, and testing of powders, as well as their conditioning for powder metallurgy operations, are discussed and a survey of the currently available commercial grades of powders is made.

Volume II consists of two parts, the first dealing exclusively with applied powder metallurgy. The various fields of industrial application of powder metallurgy products are presented in ten chapters. The second part deals with some theoretical aspects. The intention is to present a collection of specific but loosely connected subjects that might suggest applications of powder metallurgy to the reader's particular problem or to throw light on some of the fundamental principles of the process.

Volume III is a classified and annotated literature and patent reference collection useful as a source of initial information pertaining to any of the important phases of the subject.

Plan Foundry Course at Chicago

Chicago Chapter of the American Foundrymen's Society is sponsoring a Foundry Practice Demonstration Course, starting in January and continuing through March. Demonstrations will be given the second and fourth Monday of each month at the Peoples Gas Co. auditorium. Important foundry practices will be covered in the six demonstrations by experienced men. A $1 enrollment fee will be charged for the course. Further details may be obtained from J. H. Eckenroad, secretary, Crane Co., 4100 South Kedzie Ave., Chicago



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May 8-12

CLEVELAND

54th

A.F.S. FOUNDRY CONGRESS AND SHOW

All those interested in the development and manufacture of cast metals will watch events at Cleveland, when the industry meets at the A.F.S. Foundry Congress and Show, May 8-12. The newest methods, the newest equipment, will be presented to an industry at that time . . . under one roof . . . in harmony with the atmosphere that characterizes every A.F.S. Convention — **united progress through cooperative effort.**

It is the correct combination of events that make for a successful Congress . . . for the thousands of A.F.S. members and guests who will attend the technical events, the exhibits, and participate in the many social activities . . . for the firms with the foresight to join in this industry-wide gathering, the major foundry event of 1950.

Headquarters for the Meeting — Cleveland Public Auditorium — will be self-contained for an event of the scope of the 54th Foundry Congress and Show . . . a first class restaurant . . . attractive lounges . . . ample telephone facilities . . . suitable meeting rooms for the extensive technical program . . . ideal exhibit halls.

With hotel housing conditions back to normal, the 1950 A.F.S. Congress will attract the important influences from the foundry world, who will come to participate in events that will revolve around a Convention concentrated on **modernization and economy of production in the foundry.**

Cleveland Public Auditorium — May 8-12, Inclusive

AMERICAN FOUNDRYMEN'S SOCIETY

222 W. Adams St., Chicago

ACTIVITIES OF FOUNDRY *Groups*

Northeastern Ohio

NORTHEASTERN Ohio Chapter of the AFS met Oct. 13 at the Tudor Arms Hotel, Cleveland. Approximately 215 members and guests were present to hear addresses by William T. Bean Jr., research consultant, Detroit, and John E. Fintz, assistant superintendent of schools, Cleveland, in charge of special schools and activities.

Mr. Fintz spoke in connection with the presentation of Federal Apprentice Training Service Certificates of Completion to 13 patternmaking apprentices. These apprentices, guests of the patternmaking group of the chapter, recently completed a 5-year course of training. In his talk, Mr. Fintz stated that among the aims of a trade school program are to make education a continuous part of life and to help educational systems to dignify honest labor.

Oscar Poole, regional director, Apprentice Training Service, Department of Labor, presented the certificates of completion to John A. Dow, Clifford Dukes, Harry E. Farner, Frank Gangale, Frank P. Gill, Albert Jazbinski and Mike Pachan. Apprentices who had earned their certificates but were absent included Kent Arthrell, Charles Blaha, Alfred Drozdowski, Frank S. Kozielski, Joseph Rovniak and Edward Valentovic.

Mr. Bean, technical speaker of the evening, spoke on "Good Casting Design—on Purpose." Mr. Bean stated that, in his opinion, foundrymen should not merely pour a casting, but they must engineer a product. Three things are important in developing a cast product—using the proper material, adopting the correct design and determining the load to which the product will be subjected. Proper design is much easier to achieve by working up a model of the product with clay. The three-dimensional model is easily altered by the foundryman, patternmaker, engineer, and customer during the formative stages of design and the changes easily visualized in terms of the final product. When the design is completed then a draftsman can make the drawing.

He stated that good casting design, producing a casting with few stress raisers, is indicated when metal flows smoothly into the mold without turbulence.

Mr. Bean advocated the use of stress coatings and strain gages in checking the casting design for predicting serviceability of the part before it is put into service. He added that testing a casting to destruction merely indicates material strength, not design characteristics.

He concluded his talk by showing slides of some of the work he has done with design of aircraft castings. —*Robert H. Herrmann*

Central Ohio

ABOUT 60 members of the Central Ohio Chapter of the AFS met at the Chittenden Hotel, Columbus, O., on Oct. 10 for dinner and a technical meeting. Dr. O. E. Harder, formerly assistant director, Battelle Memorial Institute, reviewed highlights of developments in the foundry industry during the past 30 years, and predicted avenues which further developments can be expected to take. In steel casting, further improvements in practice likely will be along lines of improved deoxidation practice and better control of inclusions. Use of a small amount of several different alloying elements in order to obtain

(*Continued on page* 164)

NORTHEASTERN OHIO: Views of the clambake dinner of Northeastern Ohio Chapter of the AFS held at Tudor Arms Hotel, Cleveland, at the chapter's first meeting of the season, Sept. 8. Photos by Sterling N. Farmer, Sand Products Corp.

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CENTRAL OHIO: Principal speaker at the Oct. 10 meeting of Central Ohio Chapter of the AFS was Dr. O. E. Harder, Battelle Memorial Institute, Columbus, O. He is the man with the pipe in right foreground of the view above. Photo courtesy of W. H. White, Jackson Iron & Steel Co.

(*Continued from page* 162)
maximum effect from a small total alloy addition probably also will continue to play an important part in steel casting.

Dr. Harder stated that much of the future development in gray iron undoubtedly will be based on improvements in practice and techniques for producing the nodular-graphite structure. Alloys can be expected to be used widely for controlling the nature and properties of the matrix of gray irons. Recent developments and possible future activities in the fields of malleable cast iron, heat and corrosion resisting alloys, copper-base alloys, light metal castings, centrifugal castings, and precision castings also were discussed.

Another feature of the meeting was the sound movie "Men and Molds." It describes and illustrates many of the molding and melting practices of the Lynchburg Foundry Co., Lynchburg, Va.—*H. W. Lownie Jr., Battelle Memorial Institute.*

Northwestern Pennsylvania

AN interesting talk entitled "Does Sand Cause Metal Shrinkage?" was presented by Clyde A. Sanders, vice president of American Colloid Co., Chicago, at the Oct. 24 meeting of Northwestern Pennsylvania Chapter of the AFS held at the Moose Club, Erie, Pa.

Mr. Sanders explained the variables in sand handling which must be controlled to prevent metal shrinkage and obtain uniformity in castings. Harold G. Lolly, Bucyrus-Erie Co., Erie, served as chairman of the discussion period which followed.

Chairman Joseph Shuffstall, National-Erie Corp., welcomed large delegations of foundrymen from the National Bearing Division of American Brake Shoe Co., Meadville, Pa., and from the Cooper-Bessemer Corp., Grove City, Pa.

Preceding the technical session the new technicolor motion picture produced by the Malleable Founders' Society, entitled "This Moving World," was presented through the courtesy of the Erie Malleable Iron Co., and it was received with much favorable comment.

Frank Volgstadt, Griswold Mfg. Co., Erie, and vice chairman of the chapter, announced that the chapter's annual Christmas party will be held Dec. 16 at the Grotto Club Annex, Erie. Reservations can be obtained from Reginald Harding, Pickands, Mather & Co., Erie. Members of the entertainment committee arranging the party are: Charles F. Gottschalk, Cascade Foundry Co.; Duane Davis, Urick Foundry; Courtney Wilcox, Cascade Foundry; Theodore Fritz, National-Erie; Floyd Bahn, Erie City Iron Works; William Miller, Frederic B. Stevens Inc.; Paul Kennedy, Griswold Mfg. Co., and E. Sierk, Weil-McLain Co.—*Earl M. Strick, Erie Malleable Iron Co.*

Philadelphia

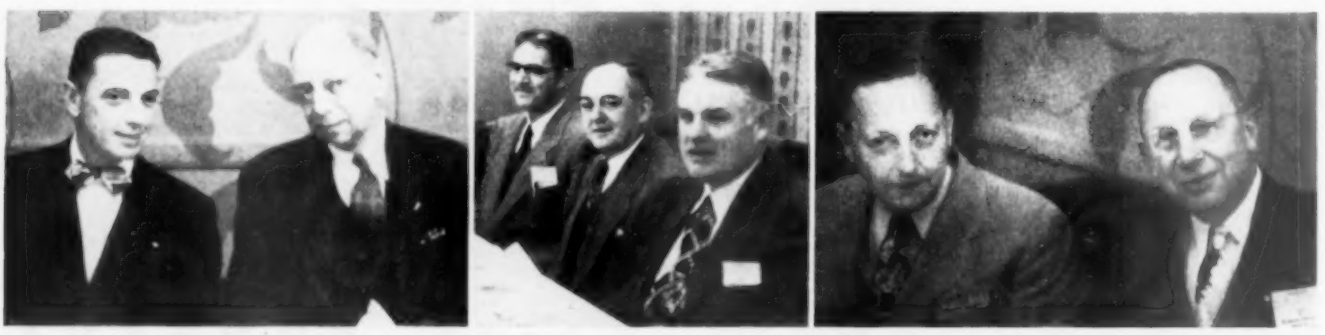
A VISIT to the Philadelphia Navy Yard, sponsored by George Bradshaw, master molder, and Captain Kniskern, commandant, featured the opening meeting of the Philadelphia Chapter of the AFS on Oct. 14, and was enjoyed by more than 200 members and guests. The pouring of a 70,000-lb propeller casting attracted considerable attention as did the machining of a similar casting. In addition, inspection of a wartime submarine was enjoyed by the visitors.

A dinner and technical meeting at the Engineers Club followed. Chapter Chairman W. A. Morley, Link-Belt Co., presided and George Bradshaw introduced William H. Johnson, Navy Research Laboratory, Washington, who discussed "Gating Systems." Mr. Johnson illustrated his talk with three motion pictures produced by the Naval Research Laboratories, "Finger Gating," "Step Gating," and "Gating Systems for Metal Castings." —*A. J. Sauté, American Engineering Co.*

Tennessee

FIRST regular dinner meeting of the 1949-50 season for Tennessee Chapter of the AFS was held at Hotel Patten, Chattanooga, Tenn., Sept. 23. Bruce L. Simpson, president, National Engineering Co., Chicago, was guest speaker on the subject, "The History and Development of the

(*Continued on page* 166)



NORTHWESTERN PENNSYLVANIA: Views of the Sept. 26 meeting of Northwestern Pennsylvania Chapter of the AFS at the Moose Club, Erie, Pa. Photos by Sterling N. Farmer, Sand Products Corp.

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TIME IN OVEN (MINUTES)
TIME IN OVEN (MINUTES)

TENNESSEE Chapter of the AFS held its first meeting of the season Sept. 23 at Hotel Patten, Chattanooga, Tenn. Shown above at the meeting are, left to right: Ray Fringe, southern representative, National Engineering Co., Chicago; Karl Landgrebe, Wheland Co., Chattanooga, chapter chairman; Bruce L. Simpson, president, National Engineering Co., guest speaker; Paul Arnold, U. S. Pipe & Foundry Co., Chattanooga, chapter vice chairman, and Herman Bohr, Robbins & Bohr, Chattanooga, chapter secretary-treasurer

(*Continued from page* 164)

Foundry Industry."

Mr. Simpson, a national director of the AFS, said that the industry is one of the oldest and has done so much for civilization that all those associated with it should be proud and should sell the public on what the foundry industry is and what it has done. The author of the book, *Development of the Metal Castings Industry*, Mr. Simpson presented a detailed synopsis of that volume and illustrated his discussion with an interesting collection of slides.

Karl Landgrebe, Wheland Co., Chattanooga, and chairman of the chapter, presided and Paul Arnold, U. S. Pipe & Foundry Co., Chattanooga, who is vice chairman of the group, introduced the speaker. A report from Porter Warner, Porter Warner Industries Inc., indicated that the chapter now has 154 members. Three newest members are Leo Weaver, Carl O'Neal and William Marlin of the Lewisburg Casting Co., Lewisburg, Tenn.—*Carl A. Fischer, Fischer Supply Co.*

Eastern Canada

EASTERN Canada Chapter of the AFS on Sept. 30 and Oct. 1 staged a two-day technical conference and an outing at Sherbrooke, Que. The program was arranged by a committee of 46 members headed by A. J. Moore, Montreal Bronze Ltd., chairman; M. A. Hughes, LaSalle Coke Co., vice chairman; W. C. Rowe, Crane Ltd., in charge of entertainment; D. Coates, Canadian Ingersoll-Rand Co. Ltd., registration; and C. Atkinston, George F. Pettinos (Canada) Ltd., in charge of arrangements for the outing. The meeting attracted 165 members and guests.

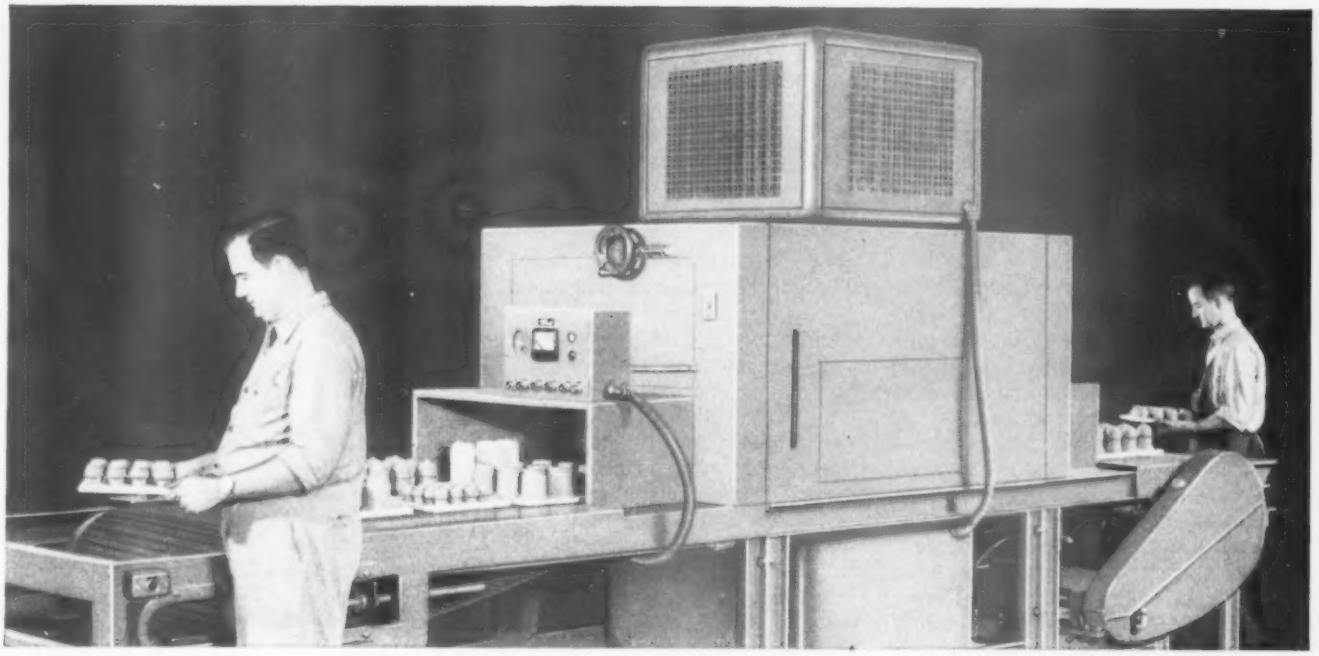
General topic under consideration at all sessions was "Gates and Risers."

The steel portion of the technical sessions had as chairman, C. V. Hacker, Lynn MacLeod Metallurgy Ltd. The paper was given by W. T. Shute of Canadian Car & Foundry Co. Ltd. Mr. Shute pointed out that only by providing castings of high quality could the steel casting industry in any way offset the penetration of the forging and fabricating industries into its domain. Mr. Shute pointed out that in order to obtain good quality in steel castings, it is essential that good gating and risering practice be adhered to in all instances.

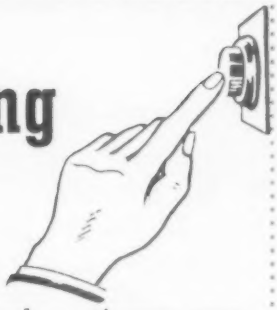
W. Bennett of Dominion Engineering Works gave an informative and comprehensive paper on "Gates and Risers for Brass and Bronze Castings." J. G. Dick, Canadian Bronze Co. Ltd., served as technical chairman. Mr. Bennett dealt principally with high shrinkage and heavy dross forming alloys. The methods of gating and risering various shapes and sizes of castings were illustrated.

(*Continued on page* 168)

EASTERN CANADA Chapter of the AFS held a two-day meeting at Sherbrooke, Que., Sept. 30 and Oct. 1. At left are views of the head table at the dinner Sept. 30. Left to right, are: John Hunt, Dominion Engineering Works Ltd., Lachine, P.Q., chapter secretary; George Beaton, Sydney, N. S.; E. N. Delahunt, Warden King Ltd., Montreal; Gill Young, Sherbrooke; Mayor Trudeau of Sherbrooke; James H. Newman, Newman Foundry Supply Ltd., Montreal, chapter chairman; Jack Moore, Montreal Bronze Ltd., Montreal, meeting chairman; George Davidson, Sherbrooke; Norman C. MacPhee, Bureau of Mines, Ottawa, Ont.; L. Guilmette, Canadian Foundry Supplies & Equipment Ltd., Montreal, chapter vice chairman; E. MacIntush, Sherbrooke, and M. A. Hughes, LaSalle Coke Co., Montreal



Push-button baking of foundry cores



NOW you can have straight line, conveyorized, continuous core baking in a compact unit designed to save space, time, and labor!

Thermex High Frequency Core Baking Equipment produces superior foundry cores in a matter of minutes . . . cores that possess greatly improved shakeout and collapsibility characteristics.

With Thermex Core Baking Equipment, you'll save thousands of dollars annually in labor costs alone. The capacity of your mulling equipment is doubled. Far fewer mixes are required to produce a variety of cores. The labor involved in removing and re racking core plates is eliminated . . . the cores go directly to the inspection table from your Thermex Core Baking Equipment. The cores themselves have no burned or broken surfaces to cause ridges, pits, or fins that must be removed from the castings.

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The Girdler Corporation, Thermex Division

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FACTS about Thermex Core Baking Equipment

INSTALLED COST

Usually less than conventional ovens. Equipment—*complete with conveyor*—is simply placed in position and connected to power line.

OPERATING COST

Power is used only when cores are being baked and in proportion to the type and quantity. No power or time is lost in starting or in shutting down production.

MAINTENANCE COST

Negligible, because operation is remarkably simple. Only moving parts are the conveyor and exhaust blower. Push-button controls.

BINDER COST

Actually no more than the cheaper oil binders, because only one-third to one-half as much synthetic resin binder is required. A wide variety of proved resin binders is now available.

CASTING CLEANING COST

The labor normally required for correction of defects such as blow holes, pits, etc., in the casting is reduced to a minimum.

(*Continued from page* 166)

E. Delahunt, Warden King Ltd., who acted as technical chairman for the gray iron group, introduced G. Turnbull, Shawinigan Foundries Ltd., the discussion leader. Mr. Turnbull's paper digressed from the general theme of the conference in that he concentrated on the subject of costs in gray iron foundries. Mr. Turnbull noted that at present many customers of iron foundries are asking for lower priced castings, although other costs are generally on the upswing. The speaker urged that shops equip themselves so that more work could be obtained from their existing personnel and so that the greatest production could be obtained from highly skilled personnel in particular.

Both Norman Bradley, Canadian Ingersoll-Rand Co. Ltd., and Alex Watson, Canadian National Railways, presented brief talks on "A Patternmaker in the Foundry." They stressed the importance of the patternmaker working with the foundryman and the foundryman co-operating with the pattern shop. Robert Stott, Canadian Car & Foundry Co. Ltd., served as technical chairman.

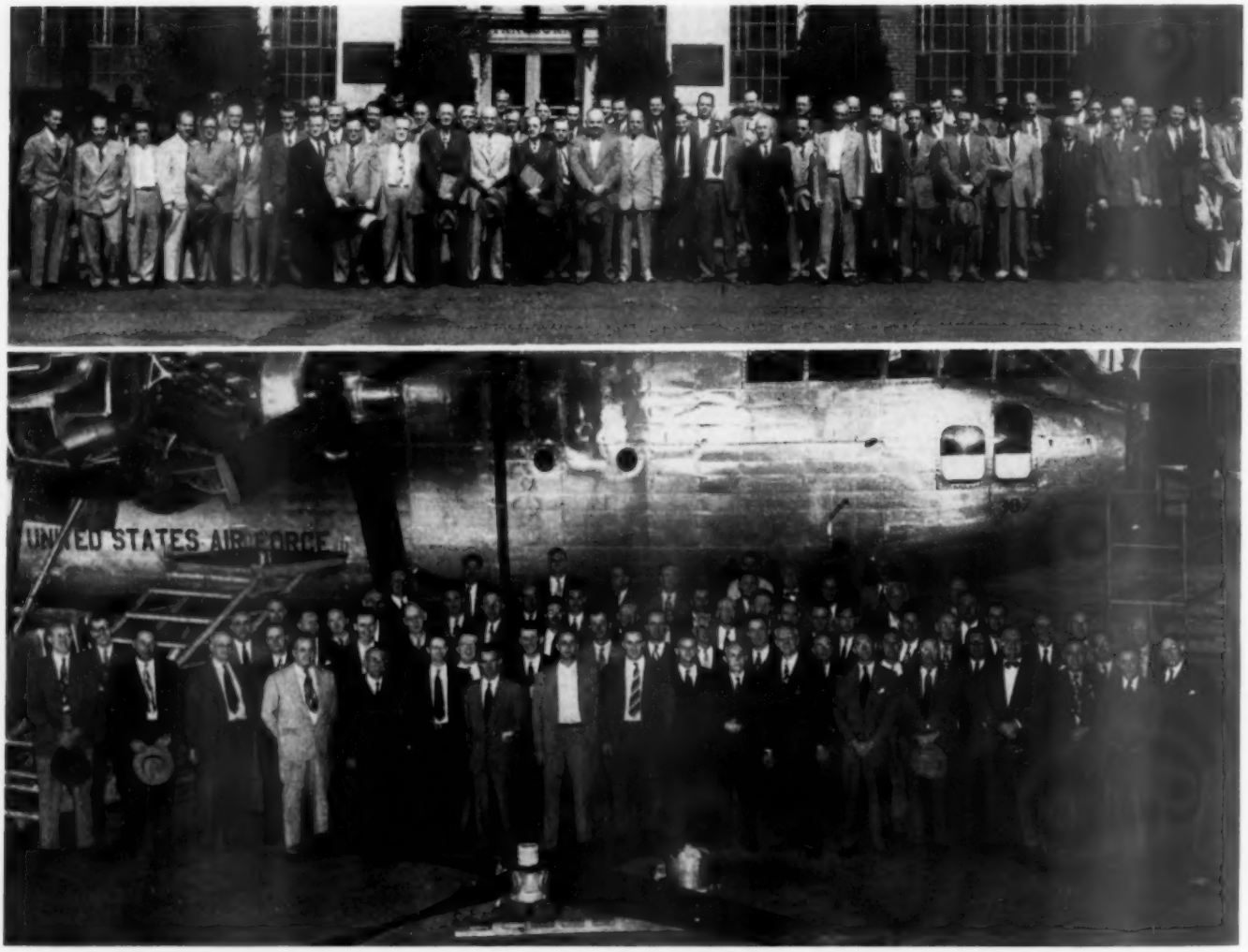
A featured speaker during the conference was H. Louette of Warden King Ltd., who discussed "Scabbing Tendencies in Molding Sand."

On Friday evening prior to dinner a "Getogether" was arranged by the supply houses of the area. And Saturday afternoon a successful outing was held at the North Hatley Country Club with competitive games of golf, baseball, and horseshoe pitching being staged. A tug of war and an impromptu football game also took place. The supply houses of the Sherbrooke area donated generously toward prizes for the various events.

An excellent description of nodular iron and some of its practical applications was presented by J. E. Rehder, foundry engineer, Canadian Bureau of Mines, Ottawa, Ont., at the Oct. 14 meeting in Montreal of Eastern Canada Chapter.

Mr. Rehder illustrated his speech with slides to describe nodular iron in relation to cast iron and malleable iron. Nodular iron can be produced from a cupola, electric furnace or other melting equipment together with ladle addition of cerium or magnesium master alloys. This ladle treatment is followed by a ladle inoculation of ferrosilicon, or other silicon alloys in the amount of about 0.40 per cent silicon. To minimize the violence of the reaction of the molten iron poured over pure magnesium metal, several magnesium master alloys of copper, nickel and ferrosilicon can be obtained from producers with various magnesium contents. The recovery of magnesium in treated iron is low. A 50/50 alloy is recommended and although somewhat more difficult to use, has the advantage of keeping copper and nickel to a minimum when these elements are not particularly required.

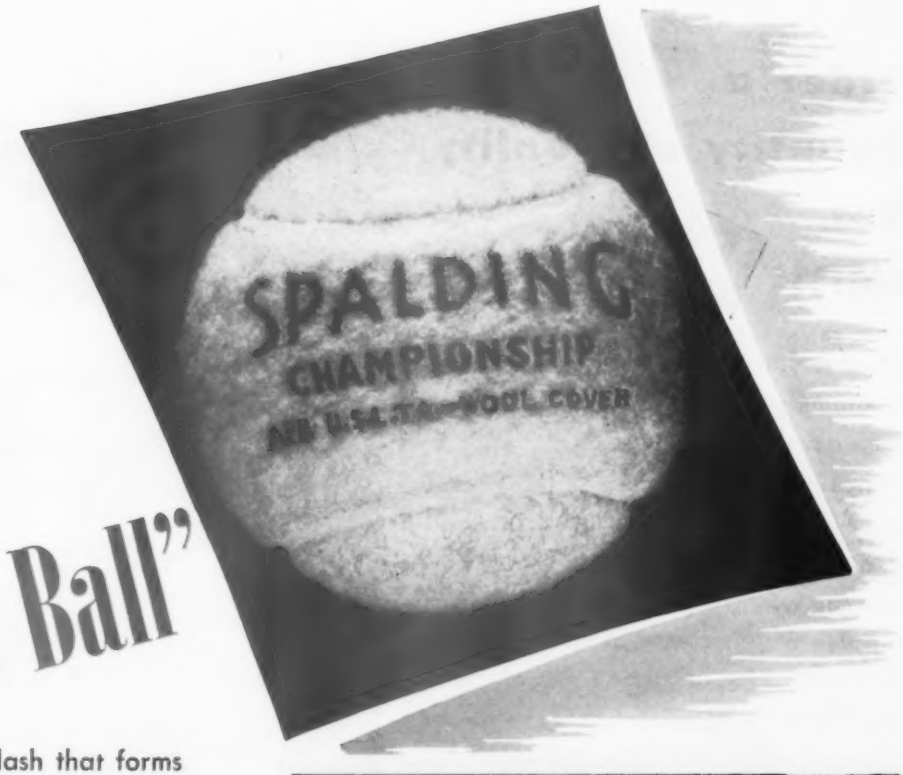
(*Continued on page* 171)



CHESAPEAKE Chapter of the AFS held its first meeting of the season at Hagerstown, Md. During the day, chapter members visited the Pangborn Corp., as shown in upper photo, and the Fairchild Aircraft plant, bottom photo. Dinner was held at the Fontainhead Country Club, followed by an address on "Technology of Foundry Sand Testing" by Frank Brewster, Harry W. Dietert Co., Detroit

Seventh in a series of
Unusual Grinding
Wheel Operations

"Grinding Wheel Serves Tennis Ball"



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Meticulous care in compounding plus processing by the Dow-Therm method of heat treatment contribute to its outstanding quality. Controlled uniformity, too, is evident because of this particular attention to detail during manufacture. Smith L-O Core Oil is available to you in a number of grades . . . to provide maximum and consistent results with the type of sand you use and type of metal cast. A trial run with Smith L-O will give conclusive proof of superiority. Order your requirements today!

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WAREHOUSE STOCKS AVAILABLE
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INDUSTRIAL OILS DIVISION . . . ROCKFORD, ILLINOIS

(*Continued from page* 168)

Mr. Rehder recommended the following composition: Carbon, 3.50 to 3.70 per cent; silicon, 2.60 to 2.80 per cent; manganese 0.40 per cent maximum; phosphorus 0.15 per cent maximum, with sulphur content as low as possible. Iron containing 0.08 per cent to 0.10 per cent or higher of sulphur can be treated to produce nodular iron but at extra cost due to a higher consumption of expensive magnesium master alloys.

In the as-cast condition, a tensile strength up to 105,000 psi can be developed with some ductility. A range of mechanical properties can be obtained by different heat treatments. Annealing develops ferritic structure which shows 15 to 20 per cent elongation and 65,000 to 75,000 psi tensile strength. — *A. J. Moore, Montreal Bronze Ltd.*

Quad City

FOOTBALL interest was high among the 125 members and guests present at the Oct. 17 meeting of Quad-City Chapter of the AFS at which Bob Austin, a big league official in football, baseball and basketball, presented an entertaining coffee talk.

Technical session featured Bradley H. Booth, foundry engineer for Carpenter Bros. Inc., Milwaukee. Locations of good sand producing areas were shown and Mr. Booth commented on the type of sand found. Starting with the Albany deposits and working on west to Ottawa, the speaker described the handling equipment and drying facilities as each

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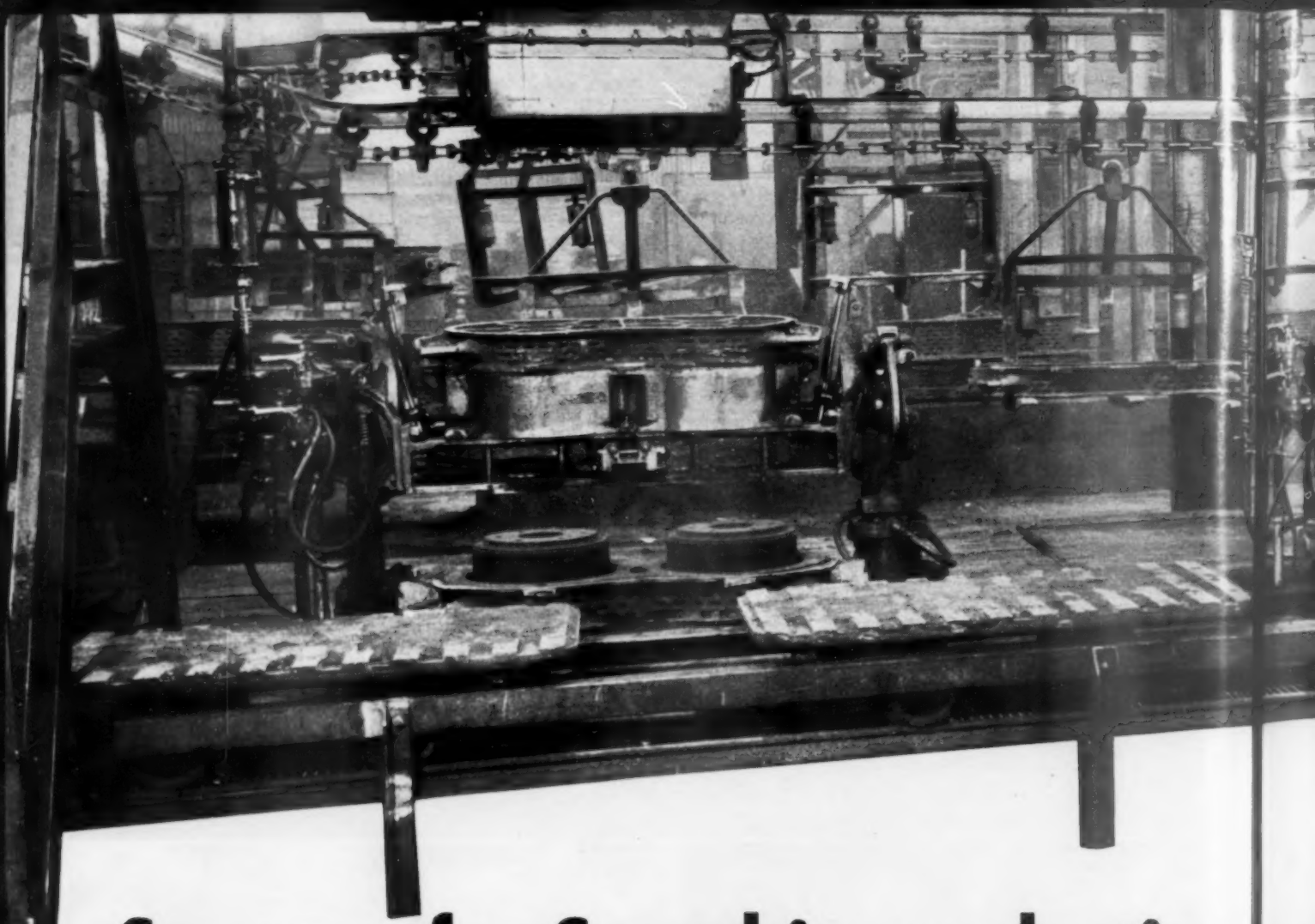
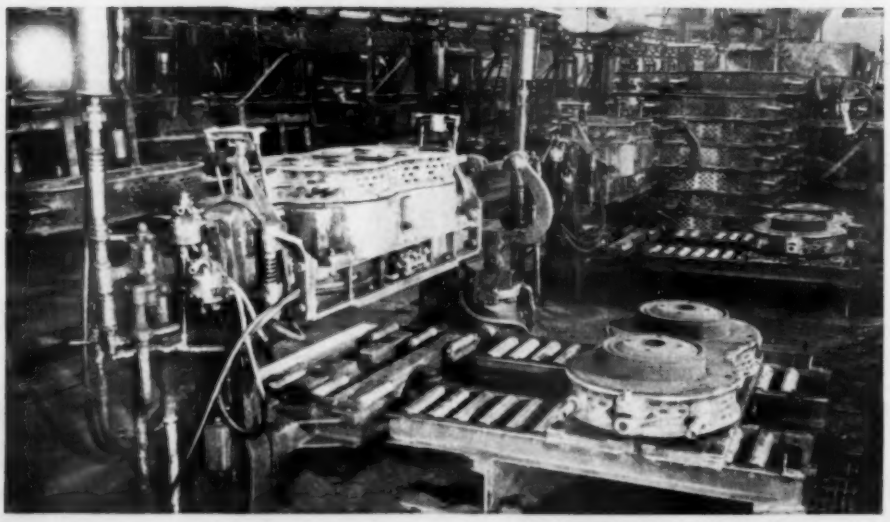
CENTRAL INDIANA Chapter of the AFS held its annual stag outing and picnic at Lakeshore Country Club, Indianapolis, Sept. 10



Squeeze for Speed in production



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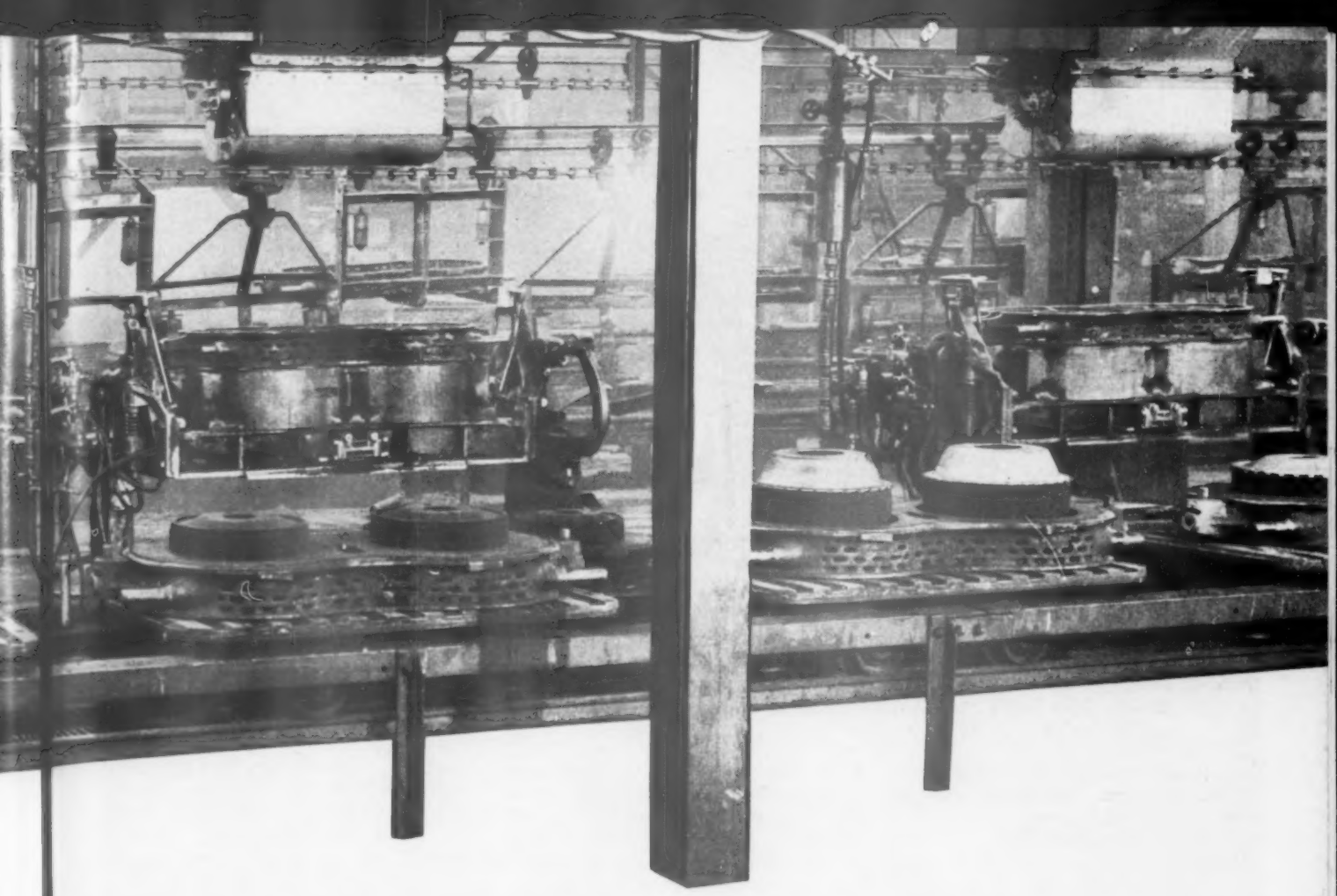

n of drag moulds *with* OSBORN JOLT-ROLLOVER SQUEEZE PATTERN DRAW MOULDING MACHINES

HERE'S how production and semi-production foundries have increased output and lowered manufacturing costs of drag moulds. Squeezing either eliminates or materially reduces hand ramming time. The center of gravity rollover combined with roller conveyer discharge permits operator to make a complete mould from one side of the machine.

It's a versatile machine, too, capable of handling a variety of work. Available in a range of sizes with larger units being equipped with air clamps and power rollover.

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MOULDING MACHINES CORE BLOWING MACHINES

MEMBER MANUFACTURER'S ASSOCIATION INC. FOUNDRY EQUIPMENT

QUAD CITY: Directors of Quad City Chapter of the AFS present at the Oct. 17 meeting are: Standing, left to right: P. E. Wright, Fairbanks, Morse & Co., East Moline, Ill.; C. S. Humphrey, C. S. Humphrey Co., Moline; William C. Bell, Frank Foundries Corp., Moline; Harold A. Rasmussen, General Pattern Corp., Moline, chapter vice chairman; A. A. Zuber, Carver Pump Co., Muscatine, Iowa; J. H. Nelson, Mississippi Foundry Corp., Rock Island, Ill.; Russell H. Swartz, Riverside Foundry Corp., Bettendorf, Iowa. Seated, left to right, are: Elmer C. Zirzow, Deere & Co., Moline; Bradley H. Booth, speaker, and E. P. Closen, John Deere Planter Works, Moline, chapter chairman

(*Continued from page* 171)
pit was discussed. Mr. Booth related some of his experiences while serving on the AFS Sand Committee in connection with testing equipment. He emphasized the need for uniformity and the present lack of it. Sand ramming is the greatest variable and this controls both permeability and green strength. The sample cylinder surface is important, according to Mr. Booth, because a rough surface offers resistance and prevents sufficient ramming.

Succeeding programs scheduled by the chapter are: Dec. 9, Christmas party, Blackhawk Hotel, Davenport, Iowa; Jan. 16, 1950, "Gates and Risers," Harry H. Kessler, manager, foundry operations, Sorbo-Mat Process Engineers, St. Louis; Feb. 20, "Malleable Gating and Feeding," B. C. Yearley, assistant manager, National Malleable & Steel Castings Co., Cicero, Ill.; Mar. 20, "Core Room, Cutting Costs," L. P. Robinson, Werner G. Smith Co., Cleveland; Apr. 17, "Nodular Graphite in Cast Iron," by a speaker from the Dow Chemical Co., Midland, Mich.; May 15, "Aluminum Alloys—Fabrication and Applications," W. E. Sicha, assistant chief, Cleveland Research Division, Aluminum Co. of America, Cleveland; June 17, annual outing.—*R. E. Miller, John Deere Planter Works.*

METROPOLITAN Chapter of the AFS at its meeting Oct. 3 heard C. A. Sanders, vice president and sales manager, American Colloid Co., Chicago, speak on "Care and Handling of Sand." Shown above, left to right, are: Thomas J. Wood, district works manager, American Brake Shoe Co., New York, and chapter chairman; Mr. Sanders, and J. A. Bukowski, metallurgist, Worthington Pump Co., and past chapter chairman. Photo by John Bing, Metropolitan Refractories Corp.

Metropolitan

ELEVENTH year of the Metropolitan Chapter of the AFS was opened with a meeting Oct. 3 at the Essex House, Newark, N. J., at which Clyde A. Sanders, American Colloid Co., Chicago, discussed "Does Sand Cause Metal Shrinkage?"

Introduced by George F. Watson, American Brake Shoe Co., Mahwah, N. J., Mr. Sanders described the extensive work he has done on the relationship of grain size and permeability of molds to casting defects. The speaker believes that shrinkage in castings decreases with increased density of sand. This increase in density can be brought about by harder ramming in sections which tend to shrink, thereby decreasing the amount of air, which is highly insulating, in the mold.

Program for the balance of the chapter's 1949-50 season was announced by D. S. Yeomans, G. F. Pettinos Inc., chapter program chairman, as follows: Dec. 9, Christmas party; Jan. 9, 1950, "Melting Practice Round-Table, Steel, Light Metals, Gray Iron, Brass and Bronze," with C. M. Apgar, Taylor Wharton Iron & Steel Co., R. E. Ward, Bendix Aviation Corp., C. L. Lane, Florence Pipe Co., and B. A. Miller, Baldwin Locomotive Works, as speakers; Feb. 6, "Modern Foundry Refractories," Mr. Rickey, Ironton Fire Brick Co., speaker; Mar. 6, "Spheroidal Carbon Iron;" Apr. 3, "Gating and Risering," Norman A. Birch, American Brake Shoe Co., speaker. —*Carl Szego, Moldcast Products Inc.*

Connecticut Non-Ferrous

ROUND-table discussion on gating and risering castings featured the Sept. 21 meeting of the Connecticut Nonferrous Foundrymen's Association at Indian Hill Country Club, New Britain, Conn.

In considering red brasses, it was pointed out that general castings mounted on matchplates are poured from the end without risers. However, too large a gate results in washes and too small a gate will not run the castings. Valves made of 85-5-5-5 bronze must be generously gated and risered.

With regard to yellow metals, small matchplate castings usually are designed with two-thirds of the gate in cope and one-third in drag. Two ounces of aluminum is added to yellow brass for fluidity. In making manganese bronze castings, risers generally are about three times as large as those used in red metals.

(*Continued on page* 176)

5 REASONS FOR CLEVELAND TRAMRAIL CORE-HANDLING EQUIPMENT

Above: After baking the racks are taken directly to molding floor. No time-conserving rehandling of cores.

Below: Coremakers' plates of cores are placed on racks conveniently located. When racks are loaded, they are propelled into ovens.

1 ELIMINATES REHANDLING — Delivers cores from coremaker to oven, thence to molding floor, via overhead tramrail route without rehandling.

2 CUTS COSTS — Saves time, speeds production, cuts costs. Coremakers spend more time making, less time handling cores.

3 REDUCES BREAKAGE — Easy operating carriers on smooth overhead track eliminate damaging vibrations and shocks. No chafing, cracking, or breaking of cores in transit.

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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

(*Continued from page* 174)

Test bars are cast before pouring and fractured to regulate composition and physical properties. Large castings are gated from the bottom to prevent agitation. No fluxes are used. Aluminum bronzes in general require larger gates and risers than manganese bronze with sprues choked.

Castings from nickel and monel are cast into molds faced with synthetic sand made of sharp silica sand, western bentonite, wood, and iron oxide. Oxygen is removed with magnesium and nitrogen with titanium. Castings are poured from the top with large risers. — *Charles A. H. Knapp, R. Lavin & Sons.*

Central Illinois

IMPRESSIONS gained during a recent European trip were presented by L. D. Harkrider, president, General Malleable Corp., Waukesha, Wis., at the Oct. 3 meeting of Central Illinois Chapter of the AFS held at the Jefferson Hotel, Peoria, Ill.

In 1948, Mr. Harkrider as president of the Wisconsin Manufacturers' Association, toured Europe as a member of a trades group sponsored by that organization. He was able to exchange views with manufacturers in England, Norway, France, Denmark, Belgium and Luxemburg.

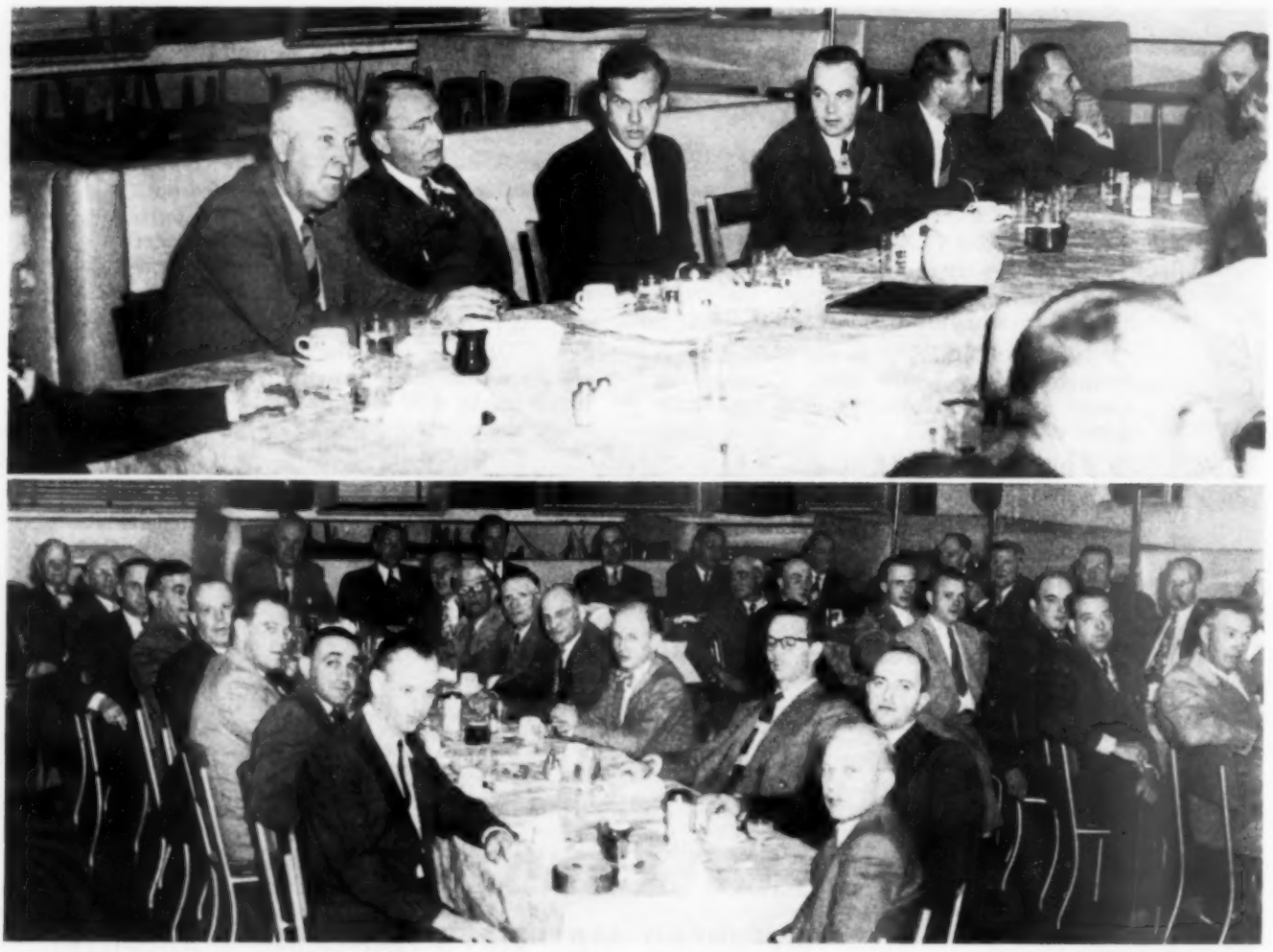
Mr. Harkrider stated that he was impressed by the willingness and eagerness shown by the Germans to get their industries into motion. He believes this is vital to the industrial recovery of Europe. He spoke highly or Norway's enthusiasm as evidenced by their plans to harness fast moving streams because of short coal supply. Europe, in general, he said, has an abundance of resources, know-how, and men of ability. He felt that these would be more effective, however, were it not for the complications of several monetary systems. Mr. Harkrider stated that he sensed the concern of many Europeans over the state of Russian internal affairs. They recall Bismark's resort to war to unite Germany in 1850.

The following were appointed to serve as committee chairmen for the season: W. G. Schuller, program; C. R. Russell, entertainment, and L. Maurer, membership.—*John R. Nieman, Caterpillar Tractor Co.*

Pittsburgh

LATEST materials handling techniques applicable to small jobbing foundry operations were discussed at length at the Oct. 17 meeting of Pittsburgh Foundrymen's Association. R. W. Mallick, executive department, Westinghouse Electric Corp., East Pittsburgh, Pa., pointed out that in addition to competition from other materials, metal castings must compete with at least seven other basic methods of forming materials. Therefore, the economics involved with the effectiveness of plant layout or materials handling is entirely divorced from the ever-present struggle for improvements to the basic arts themselves. Consequently, one can readily see how foundries

(*Continued on page* 178)



TIMBERLINE Chapter of the AFS met at the Silver Wing Cafe, Denver, Sept. 26 to hear Frank G. Steinebach, editor, *The Foundry*, discuss "What's Ahead in the Foundry Industry." Mr. Steinebach is shown second from left at speakers' table

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(*Continued from page* 176)

with the most advanced know-how concerning process can find themselves non-competitive.

It is imperative to remember that in the manufacturing industries there are only three basic operations. They are processing, assembling, and handling. The first two add value to the product; the third does not. However, it often accounts for more labor costs than do the first two.

Mr. Mallick's comments were illustrated with slides depicting before and after scenes of materials handling techniques applicable to storage, sand handling, and other phases of foundry operations.

Another feature of the meeting was a dscussion of the aims, success to date, and future plans of the Foundry Educational Foundation by John M. Price, president, Ferro Machine & Foundry Inc., Cleveland, assisted by George K. Dreher and J. E. Brinton, who are associated with the foundation.—*J. C. Sullivan.*

Saginaw Valley

FIRST meeting of the current season for Saginaw Valley Chapter of AFS was designated as company and sustaining member night and was held Oct. 6 at the Fischer Hotel, Frankenmuth, Mich. In addition, honorary life members of the AFS in the area were invited to be guests of the chapter. There were 200 members and guests present.

Principal speaker for the technical program was William A. Hambley, vice president and foundry manager, Wilson Foundry & Machine Co., Pontiac, Mich., and Howard H. Wilder, metallurgist, Eaton Mfg. Co., Foundry Division, Vassar, Mich., served as technical chairman. Mr. Hambley's subject was "Casting Defects," and he pointed out that before a defect can be corrected or its cause located, it is first necessary to diagnose the defect as to type. He particularly stressed the difference between shrinks and blows. Mr. Hambley is recognized as an authority on this subject and is currently serving as chairman of the AFS Casting Defect Committee.—*Kenneth H. Priestley, Vassar Electroloy Products Inc.*

Birmingham

A DOUBLE-FEATURE program was arranged for the first meeting of the 1949-50 season by the Birmingham District Chapter of the AFS, held Oct. 21. W. R. Jaeschke, Whiting Corp., Harvey, Ill., a practical and technical foundryman with 25 years experience, spoke on "Mechanization of the Cupola." Mr. Jaeschke used a number of slides to illustrate progress from the old type of hand-charged cupola to the latest in automatic, mechanically-charged cupolas. The speaker complimented Birmingham foundrymen on already having some of the most modern installations in operation in their district. Pictures of the S-type swivel charger now being used in a Birmingham foundry, and a 15-minute sound movie entitled "Yard to the Cupola," were shown.

Preceding the technical talk, Dr. James T. MacKenzie, technical director of the American Cast Iron Pipe Co., Birmingham, and a trustee of the Foundry Educational Foundation, spoke on the progress of the foundation, especially in Alabama. Dr. MacKenzie said that a dream of the Birmingham AFS Educational Committee was realized this fall when the new foundry building, complete with all necessary equipment, was opened at the University of Alabama and students began getting a practical foundry education. This program was developed through the co-operation of the foundry industry and equipment manufacturers. The total investment in building and equipment, according to Dr. MacKenzie, approximates $75,000. Harold M. Gade, foundry instructor at the university, was introduced by Dr. MacKenzie. Mr. Gade received his bachelor of science degree in metallurgy from Massachusetts Institute of Technology.

Morris Hawkins, Stockham Valves & Fittings Inc., and vice chairman of the chapter, introduced the speakers and Chairman C. P. Caldwell, Caldwell Foundry & Machine Co., presided over the dinner and technical session which was attended by 86 members and friends.—*J. P. McClendon, Stockham Valves & Fittings Inc.*

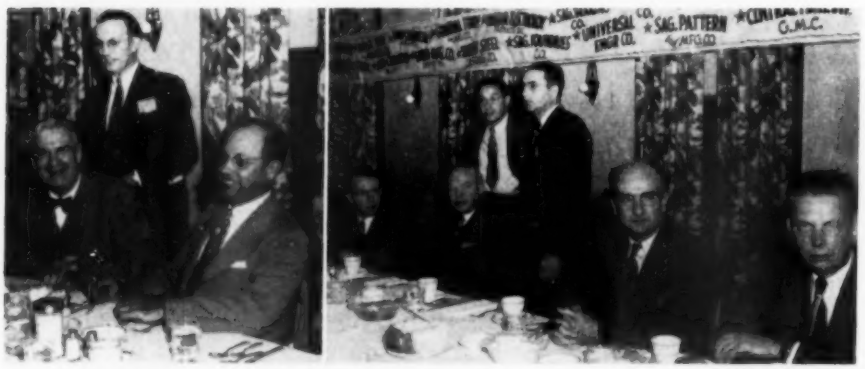
No. Illinois and So. Wisconsin

THE AFS research film, "Fluid Flow in Transparent Molds," was presented by S. C. Massari, technical director of the AFS, at the Oct. 11 meeting of Northern Illinois-Southern Wisconsin Chapter of the AFS at Hotel Freeport, Freeport, Ill.

The study was undertaken at Battelle Memorial Institute and its results are particularly important to aluminum and magnesium foundries because it indicates several principles on gating and pouring techniques which should aid in reducing oxidation of the metal stream. It was demonstrated that air can be introduced into the metal stream either through the sprue or through voids in the sand. Air is entrapped in the stream at the sprue by turbulent flow and through the formation of a vortex or whirlpool. These avenues of entree can be eliminated by smooth rounded sprue lips, which permit the metal to change direction gradually, and by proper pouring speed. Entrance of air through the sand is possible whenever atmospheric pressure exceeds hydrostatic pressure of the stream of metal.

The film indicated that the length and taper of the down sprue plays an important part in building up the pressure of the metal stream so

(*Continued on page* 180)



SAGINAW VALLEY Chapter of the AFS met Oct. 6 at the Fischer Hotel, Frankenmuth, Mich. Two views of the speakers' table are shown above. From left to right across the two views are, seated: John Grennan, former University of Michigan instructor; Harry W. Dietert, Detroit; Howard H. Wilder, Eaton Mfg. Co., Vassar, Mich., technical chairman; William A. Hambley, Wilson Foundry & Machine Co., Pontiac, Mich., speaker; Maurice Godwin, Bostick Foundry Co., Lapeer, Mich., and Oscar E. Sundstedt, General Foundry & Mfg. Co., Flint, Mich. Standing, left to right, are: Raymond H. Klawuhn, General Foundry & Mfg. Co., Flint; A. T. Peters, Dow Chemical Co., and Lyle L. Clark, Buick Motor Division, Flint, chapter chairman

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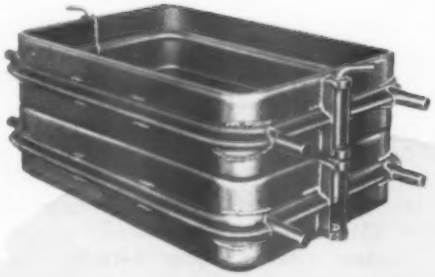

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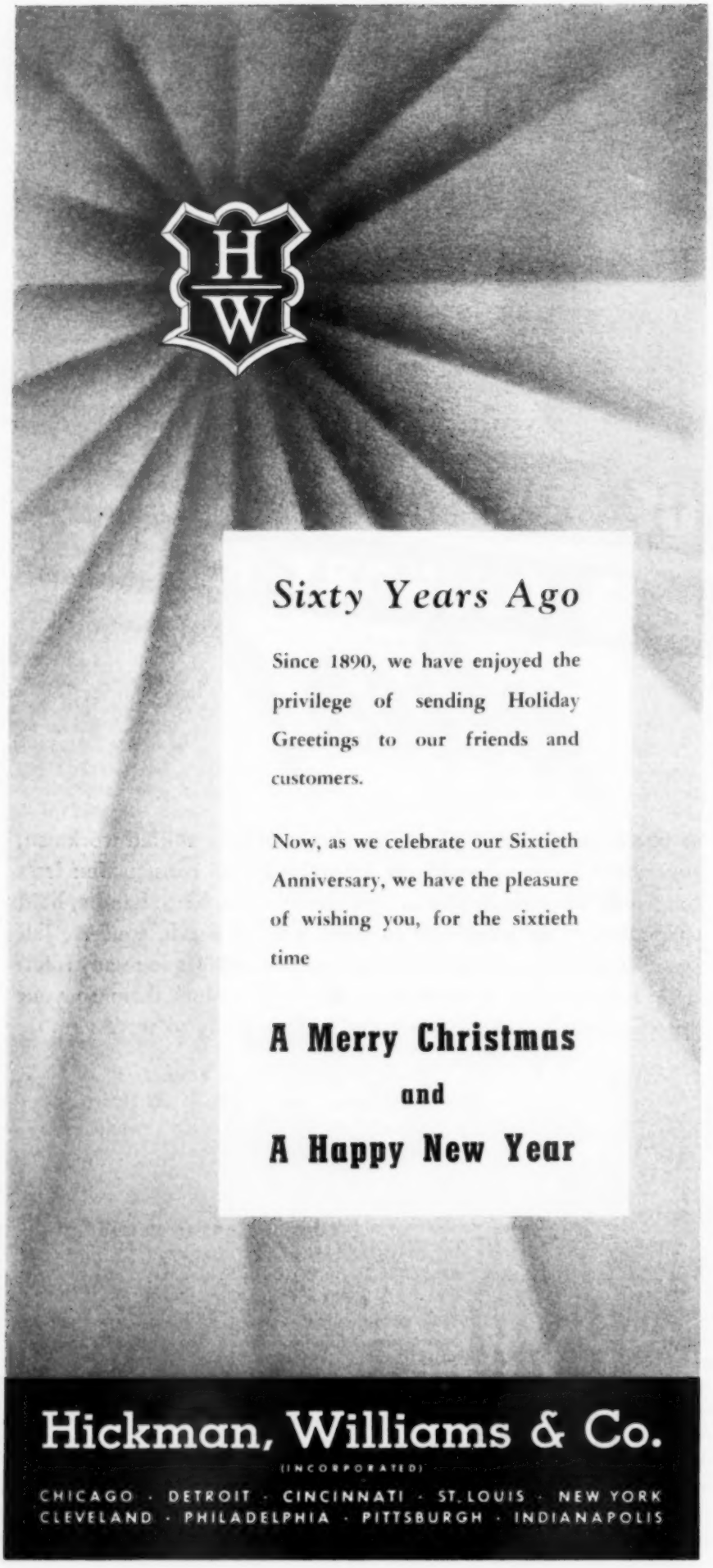
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(*Continued from page* 178)

that it is possible to exceed atmospheric pressure. Generally, positive tapered sprues—small end down—tend to prevent admittance of air through the sand whereas negative tapered or straight sprues seem to promote the admittance of air. Air also can be admitted along the runner if the metal flow becomes turbulent. Abrupt changes in direction are chiefly responsible for turbulent flow within the runner length, therefore streamlining the channel is the best solution.

It was announced that the chapter will sponsor an apprentice contest to include wood and metal patterns, gray iron, steel and nonferrous molding.—*Jerry M. Zilka, Gunite Foundries Corp.*

Ohio State University

THE motion picture "Iron Ore to Motive Power," a film covering Ford foundry operations, featured the opening meeting of the Ohio State University Student Chapter of the AFS held Oct. 11 in the Industrial Engineering Building of the university at Columbus, O. Robert Gardner, supervisor of production control, Ford Motor Co., Dearborn, Mich., gave a running commentary on the film which illustrated mechanized production of cylinder block castings. A discussion of the technical aspects of foundry mass production followed the showing of the film.

Prof. Douglas C. Williams, chapter adviser, announced that fabrication of the new conveyor and sand conditioning systems in the university's foundry will begin soon.

Newly installed chapter officers are: Harold J. Gonya, chairman; Dallas M. Marsh, vice chairman; Charles J. Weiland, secretary; Donald R. Dunlap, treasurer. On Oct. 10, the officers were dinner guests of Norman J. Dunbeck, Eastern Clay Products Inc., Jackson, O., a national director of the AFS, at the meeting of the Central Ohio Chapter held at the Chittenden Hotel, Columbus.—*Dallas M. Marsh.*

Cincinnati

SIMPLIFICATION of Light Metal Design and Its Effect on Serviceability" was the title of a discussion by William T. Bean Jr., consultant, Detroit, at the Oct. 10 meeting of Cincinnati District Chapter of the AFS held at Engineering Society headquarters. Approximately 85 members and guests attended the meeting.

Pointing out that casting design

(*Continued on page* 182)

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(*Continued from page* 180)

presents a three-point problem consisting of material, design and load, the speaker showed that neglect of any one of those factors results in instability of the casting in service. Mr. Bean emphasized the need for evaluation of material properties in a casting and not in a standard test bar. Evaluation of loads and consequent stresses was made by SR-4 gages showing—among other things—how elimination of ribs in castings could lead to a lighter and stronger part.

The speaker also spoke of the versatility of the casting process and said that in his experience there was a close relationship between good flow and good stress distribution in a casting. As compared with other methods of processing, it is relatively easy to achieve optimum stress distribution in producing castings. In conclusion, Mr. Bean urged foundrymen to do their own designing of castings.—*John F. Kahles, University of Cincinnati.*

Reading

APPROXIMATELY 150 persons attended a joint meeting of the Reading Foundrymen's Association and the newly organized Conestoga Foundrymen's Association of Lancaster, Pa., at the Berkshire Hotel, Reading, Pa., on Oct. 18. Immediately after the business meeting, two technical conferences were held. At the first, "Nodular Cast Iron" was discussed by Thomas G. Johnston, Republic Steel Corp., Cleveland. Thomas Blank, vice president of the Conestoga association, served as technical chairman. "Bronze Castings" was discussed at the second conference by R. A. Colton, Federated Metals Division of American Smelting & Refining Co., Philadelphia, with Todd Belfield, president of the Conestoga organization, as technical chairman.

The Conestoga Foundrymen's Association invited the Reading group to meet with them in Lancaster in March.—*W. I. Cassidy, secretary.*

Twin City

PRINCIPAL speaker at the Oct. 11 meeting of the Twin City Chapter of the AFS, held at the Covered Wagon, Minneapolis, was William B. George, foundry engineer, R. Lavin & Sons Inc., Chicago. His discussion on costs of producing brass and bronze castings was enlightening.

Mr. George pointed out that many brass foundries bid on jobs by guess or by knowing what the former price

(*Continued on page* 184)

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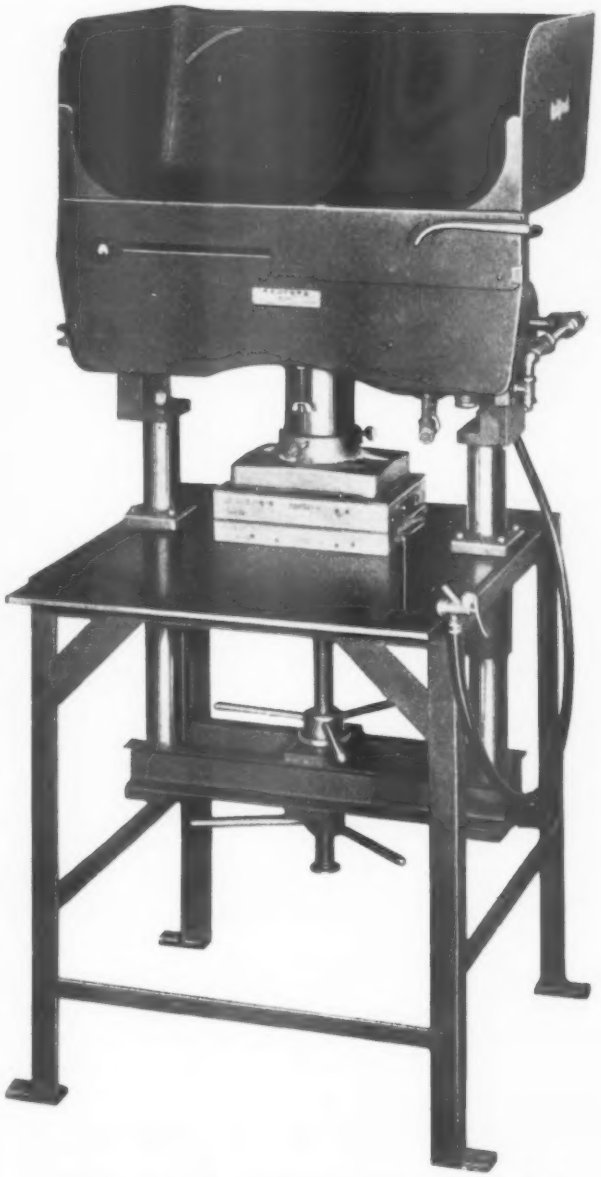

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(*Continued from page* 182)

was and underbidding. As a result, many of these foundries either are losing money or bidding too high to get the jobs. Systematically laying out on a blackboard methods of figuring costs depending on casting yield, Mr. George showed why it costs 32 cents per pound for some brass castings while others must command a price of 59 cents and even more to make the job pay. Needless to say, this discussion was of utmost importance for foundrymen in today's tighter castings market.

The second part of his talk concerned the founding of pressure-tight castings of brass and bronze. According to the speaker, the simple and only answer to the problem is "directional solidification." Mr. George indicated that only a half-dozen foundries in the country can apply this answer to difficult brass casting problems.—*J. D. Johnson, Werner G. Smith Co.*

Eastern New York

A LARGE attendance was present at the Oct. 18 meeting of the Eastern New York Chapter of the AFS held at Circle Inn, Lathams, N. Y., to hear Harry H. Kessler, manager of foundry operations, Sorbo-Mat Process Engineers, St. Louis, talk on "Gating and Risering of Castings." A graduate of the Missouri School of Mines and Metallurgy, Mr. Kessler has been associated with the iron and steel foundry industry 25 years. His ideas on castings brought forth an interesting discussion pertaining to specific casting problems.—*George E. Danner, American Locomotive Co.*

Texas

DISCUSSION concerning foundry problems and practices featured the Oct. 21 meeting of Texas Chapter of the AFS held in Houston, Tex., at the Texas State Hotel.

To interest all branches of the industry, the various groups had separate rooms for their roundtable discussions and in addition to the chairman and discussion leaders, each group also had present a patternmaker and a refractories representative to answer any problem in their respective fields.

At the steel session C. K. Flagg, Federal Steel Products, Houston, was chairman and W. J. Temple, K. O. Steel Castings Co., San Antonio, Tex., was discussion leader. Answering questions on refractories was F. G. Huber, Able Supply Co., Houston, and patternmaker representative was P. B. Croom, Houston Pattern Works.

(*Continued on page* 187)

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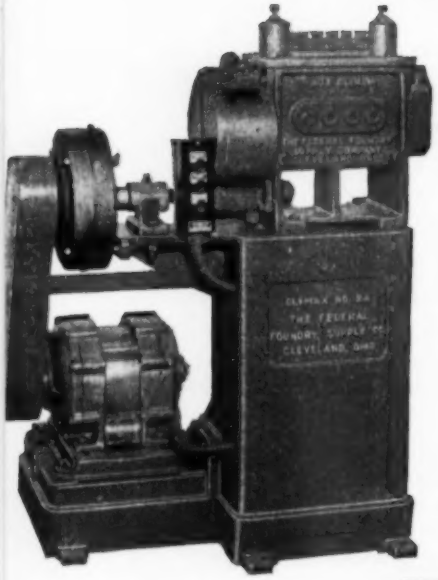

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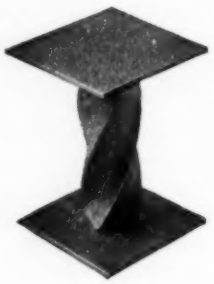

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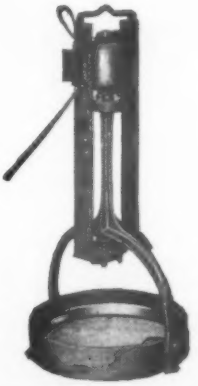
Save money by faster sifting, better sand conditioning with a Lowe Electric Sifter. Features: greater screening area, enclosed ball bearing motor, more shoveling room. Write for information. Prompt delivery.



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CHATTANOOGA, TENN. · MINNEAPOLIS · NEW YORK · DETROIT · UPTON, WYO.

(*Continued from page* 184)

Houston.

Chairman of the gray iron foundry group was Robert Lang, Lufkin Foundry & Machine Co., Houston, with R. Whitlinger, Pioneer Foundry, Houston, serving as discussion leader. W. A. Bittel, Royal Fire Brick & Supply Co., represented refractories and Joseph Wolf, Wolf Pattern Works, the patternmakers.

The nonferrous session had as chairman, J. Collier, Garrott Brass & Machine Co., Houston; discussion leader, Jake Dee, Dee Brass Foundry Co., Houston; refractories expert, Henry Creegar, Electro Refractories & Alloys Corp., Houston; and patternmaker, Mr. Bartholomew of the Hughes Tool Co., Houston.—*E. P. Clarke, American Wheelabrator & Equipment Corp.*

Canton

CURRENT season of the Canton District Chapter of the AFS was opened Oct. 6 with a dinner meeting at Mergus Restaurant, Canton. Sixty-five members and guests were present to hear C. T. Haller, development and research engineer of the Pittsburgh office of International Nickel Co., discuss "Spheroidized Iron." He explained how it is possible, by ladle additions of nickel-magnesium to increase the tensile strength of good gray iron from 30,000 psi upwards to 120,000 psi and also obtain elongation. His talk was illustrated with graphs and photomicrographs. H. V. Beasley, also of the International Nickel Pittsburgh office, assisted Mr. Haller in a general discussion.

The chapter was pleased to have Charles O. Burgess, technical director, Gray Iron Founders' Society, Cleveland, as a guest.—*Alexander Prentice, Stark Foundry Co.*

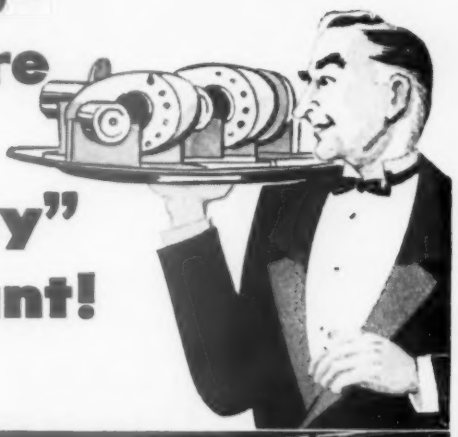
Michiana

REPRESENTATIVES from the Industrial Health Divisions of both Michigan and Indiana state health departments were present at the Oct. 4 meeting of Michiana Chapter of the AFS at the Whitcomb Hotel, St. Joseph, Mich. A model display was used in conjunction with the talk on industrial hazards to demonstrate methods of control.

K. E. Robinson, R. S. McClintock, J. T. Bower and R. Scovil were on hand from the Michigan state health organization to present the display and R. McGlasson, H. E. Bumstead and J. F. Keppler were present from the Indiana organization to answer questions. It was pointed out that

(*Continued on page* 190)

"WAITERS" ...cost more than "Tip-Money" in your plant!



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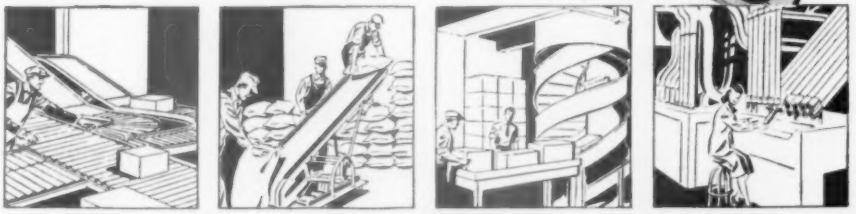

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HOW PENN. ELECTRIC STEEL CASTINGS CO.

REDUCED COSTS! INCREASED PRODUCTION! IMPROVED QUALITY!

Molding costs had to be reduced at Pennsylvania Electric Steel Castings Co., Hamburg, Pennsylvania, and since this foundry produced a large number of intricate castings on a short run basis, it was essential that any new installation maintain the flexibility of the existing jobbing set-up.

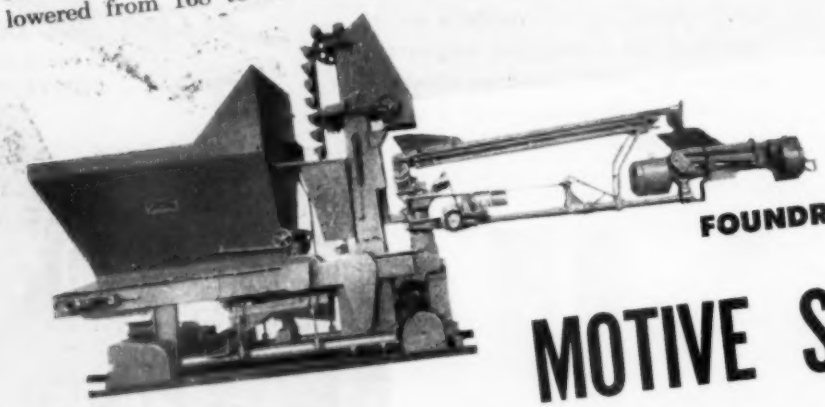
Penn. Electric management carefully studied the operations of comparable foundries and consulted various foundry engineers. The decision was made to install a Motive Sandslinger. The plan was to install the "slinger" first and to apply the savings effected to help pay for the remainder of the mechanization program.

The "Penn. Electric Plan" worked perfectly. Molding costs were immediately and substantially reduced, a night shift eliminated and manhours lowered from 168 to 112 a day. These savings were applied to help pay for further mechanization.

At the same time production was increased. Fourteen men, on a single shift, now produce molds for two to four tons more castings than twenty-one men formerly produced on a three shift operation. On one large, particularly intricate mold, production has been increased from two molds per day to five molds per day.

The molds are now rammed much truer to pattern with the usual high Sandslinger quality and "slinger" ramming has enabled Penn. Electric to retain the jobbing foundry flexibility so important to their operations.

The complete story of Penn. Electric, including photographs of the entire foundry, appeared in the September, 1949 issue of BETTER METHODS. A copy is available on request.



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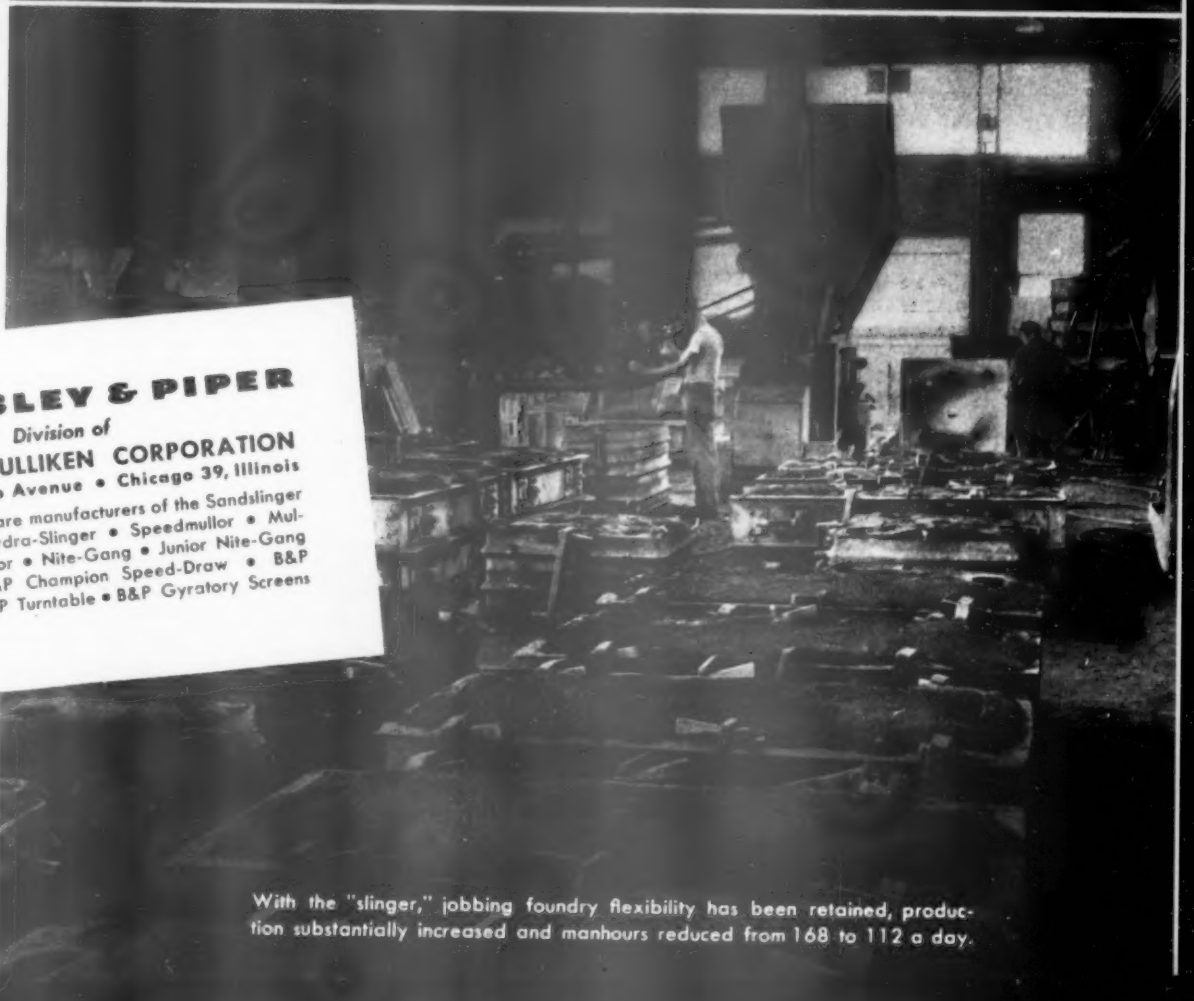
Sandslinger ramming at Penn. Electric has led to the use of a single purpose sand and elimination of facing. Molds are truer to pattern and casting quality has been greatly improved.



With the "slinger," jobbing foundry flexibility has been retained, production substantially increased and manhours reduced from 168 to 112 a day.

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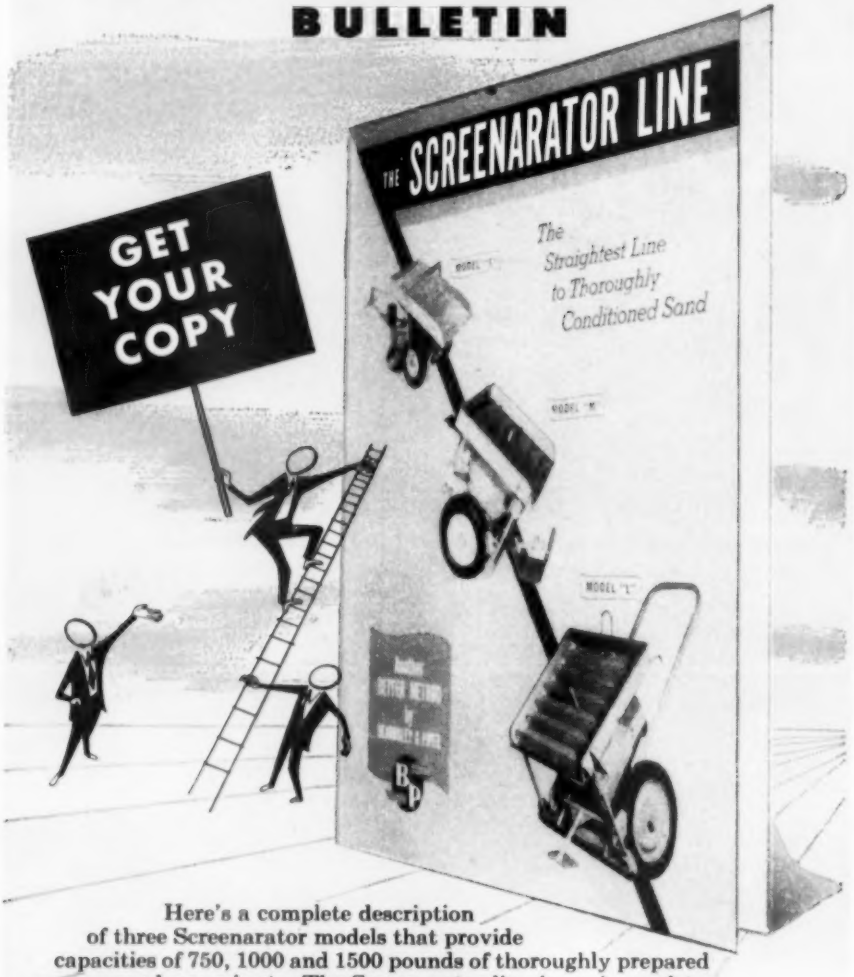
NEW

SCREENARATOR

BULLETIN



Here's a complete description of three Screenarator models that provide capacities of 750, 1000 and 1500 pounds of thoroughly prepared sand per minute. The Screenarator line is engineered to produce screened, double aerated, lump free, fluffy sand . . . at lowest initial investment and lowest cost per hour of machine operation.

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Regardless of the size or type of foundry, the Screenarator pays for itself in a short time. The coupon below will bring you the new Screenarator bulletin or details on free trial use of the Screenarator.

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(*Continued from page* 187)

both groups are available to industrial plants to assist any industry in protecting the workers' health and to make recommendations.—*J. P. Jordan, Dodge Mfg. Corp.*

Western New York

DISCUSSION of "Cost Analysis and Control" attracted 115 members and guests to the Oct. 7 meeting of the Western New York Chapter of the AFS held at the Sheraton Hotel, Buffalo. Bertram S. Stephenson, president, Tonawanda Iron Corp., North Tonawanda, N. Y., served as technical chairman and introduced Peter F. Rossman, president, Symington-Gould Corp., Depew, N. Y., who was the principal speaker.

Mr. Rossman outlined fundamentals in analyzing and controlling costs and stated that a minimum number of reports reduces paper work and permits quick action by supervision. He believes that continuous charges such as taxes, insurance, etc., should be explained to shop people and that unions would co-operate in the application of time and motion studies if they knew what was trying to be accomplished. An important cost item is materials handling and should be studied carefully. The speaker pointed out there are two types of overhead —fixed and variable, and that the break-even point in operations changes as production changes.

Through the courtesy of Earl Strick of the Erie Malleable Iron Co., Erie, Pa., the motion picture, "This Moving World," illustrating production and applications of malleable iron castings, was presented and concluded the meeting. — *Roger E. Walsh, Hickman, Williams & Co.*

Wisconsin

SECTIONAL meetings featured the Oct. 14 meeting of the Wisconsin Chapter of the AFS held at Hotel Schroeder, Milwaukee. About 230 members and guests were present, including Oscar Woehlke, formerly with Liberty Foundry Co., Milwaukee, for 30 years. Mr. Woehlke now is retired and lives in the West. His son, Les, associated with Grede Foundries, was chairman of the gray iron, malleable iron, steel and technical session.

At this meeting R. G. McElwee, Vanadium Corp. of America, Detroit, discussed nodular cast iron. This process, Mr. McElwee said, has been well covered by articles in trade journals, so he reviewed only the high spots and then answered questions from the floor. Mr. McElwee pointed out that the problem of selling nodular

cast iron is of great importance and requires qualified engineers as salesmen since it goes beyond merely advertising the product. The speaker suggested that no foundry go into nodular iron production until fully prepared for it. Before undertaking the manufacture of nodular iron castings, ask yourself: "Are we ready for this individually? Is the sales department ready to sell it intelligently?"

Mr. McElwee stated that it is not necessary to melt nodular iron in electric furnaces, if the cupola can be operated accurately for this production. Also, to go into nodular iron production a foundry must have appropriate facilities for research work.

At the nonferrous meeting, Carl Van Buren, Allis-Chalmers Mfg. Co., served as the chairman and the subject discussed was "Gating of Nonferrous Castings."

The pattern group was addressed by George Y. Anderson, Bucyrus-Erie Co., whose subject was "Simplification of Design by Co-Operation between Engineer, Patternmaker and Foundryman."—*John E. Hubel.*

Central New York

REGULAR meeting of the Central New York Chapter of the AFS was held Oct. 14 at the Mark Twain Hotel, Elmira, N. Y. More than 100 members and guests were present and Harry J. Jacobson, Industrial Pattern Works, Chicago, was the speaker.

In discussing "Corebox Design and Rigging for Core Blowing," Mr. Jacobson stated that in his opinion "core blowing has been one of the prime factors in the change of the foundry industry from a handcraft to machine-craft." The speaker showed, with the use of slides, various methods of rigging coreboxes for blowing machines. He stressed the necessity for periodic checks on equipment to prevent cores from being made that do not meet specifications. Mr. Jacobson also showed several types of coreboxes that were rigged to run on blowing machines.—*J. A. Feola, Crouse-Hinds Co.*

Mo-Kan

SOME bronze problem castings were considered at the Oct. 5 meeting of Mo-Kan Chapter of the AFS held in Kansas City, Mo., with R. A. Colton, research metallurgist of Federated Metals Division, American Smelting & Refining Co., the scheduled speaker. Some of the problems he discussed involved casting of yellow brasses, high lead alloys, nickel silver and high copper alloys. Mr. Colton listed most likely causes of defects and methods of correction, using sample castings to illustrate the discussion.

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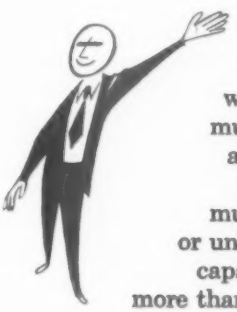
THE MULBARO

Mulling mechanism is raised and lowered by auxiliary hoist permitting several barrows to be used alternately.
Top portion contains entire mulling mechanism: totally enclosed motor, gear case, mulling wheels and plow.
Plow blends and directs sand into path of rubber tired mulling wheels where it is thoroughly mulled.
Available in two sizes: 3½ and 7 cubic foot batch capacities.
1. Sand shoveled into Mulbaro's knee-high barrow.
2. Barrow easily wheeled to mulling mechanism.
3. Barrow positioned under mulling mechanism.
4. Mulbaro quickly and thoroughly mulls.
5. Mulling mechanism raised from barrow.
6. Mulled sand wheeled to molder or coremaker.
Less sand handling—sand is loaded only once—into the knee-high barrow. After mulling, sand is carried in same barrow, directly to molder or coremaker.



The *really* portable Mulbaro is easily moved about the foundry or core room and the sand is mulled in the same barrow in which it is brought to and taken from the mullor. The sand is handled only once! With an additional barrow or barrows, the Mulbaro mulls almost continuously. While the sand is being mulled in one barrow another is being loaded or unloaded. Thus the Mulbaro offers the capacity of two or more mullors for slightly more than the price of one . . .

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NEW ENGLAND FOUNDRYMEN MEET

In Ninth Annual Conference

By FRANK G. STEINEBACH
Editor
THE FOUNDRY

ANNOUNCEMENT that the new metal processing building at the Massachusetts Institute of Technology will have an entire floor devoted to foundry teaching and research was made at the opening session of the ninth New England Regional Foundry Conference by Dr. John Chipman, head of metallurgy at the institute. Dr. Chipman stated that the present foundry program is one of the most active in the metallurgical department, and that it is a joint activity in which the departments of mechanical engineering, metallurgical engineering, and business and engineering administration are interested. Dr. Chipman spoke of the support which has been given the work of the foundry department by the Foundry Educational Foundation, the Steel Founders' Society of America, the American Foundrymen's Society, and a number of private companies.

The regional conference was held Oct. 7 and 8 at MIT under the sponsorship of the New England Foundrymen's Association, the institute, the AFS, the Boston chapter of the Non-Ferrous Founders' Society, the Connecticut Non-Ferrous Foundrymen's Association, and a number of other interested organizations. Arthur F. Dockry, H. & B. American Machine Co., Pawtucket, R. I., and chairman of the Committee on Arrangements, presided at the opening meeting, and introduced the chairman at each of the technical sessions.

Fred G. Sefing, International Nickel Co., New York, gave an interesting and instructive discussion on "Gates and Risers," at the first technical session, with Donald Sawtelle, Malleable Iron Fittings Co., Branford, Conn., presiding. Mr. Sefing stated that all gates and risers should be designed to produce controlled progressive freezing, which means that the thinnest sections and coldest metal freeze first, and this continues without interruption to the heaviest sections and hottest metal, which freeze last and are fed by the riser.

Mr. Sefing stressed the importance of cleanliness in the gating system, and indicated the advantages to be obtained with fin or knife gates from the bottom of the runner, providing the runner is kept full of metal. He recommended quiet pouring with bottom pour and plenty of gate area. Pouring temperature and speed of pouring should be given close attention. Gates should be cut to the heaviest sections, using short gates with heavy runners and riser. Mr. Sefing discussed the design and types of feeders, and indicated the advantages and disadvantages of each. He also described methods of preventing gas in metals.

The Lumen S. Brown lecture, "Public Relations and the Foundry Industry," was presented at the first afternoon session by Frank G. Steinebach, editor, THE FOUNDRY, Cleveland, with Charles F. Miller, Fairmount Foundry, Woonsocket, R. I., in the chair. This paper appears in the November issue of THE FOUNDRY starting on page 66.

J. A. Gitzen, president, Delta Oil Products Co., Milwaukee, discussed "Mold and Core Sand Additives" at the second afternoon session, with J. Southworth, Grinnell Corp., Cranston, R. I., presiding. Mr. Gitzen reviewed in detail the history and development of the various types of organic and inorganic binders, and indicated their proper applications in foundry practice. Water, the first binder used, results in trouble when employed in excess. Sticking in core boxes is the result of too much water, and the blowing of cores has been made possible only because foundrymen have been willing to reduce the water content. Using too much core oil or underbaking the cores, results in high cleaning costs. Mr. Gitzen emphasized that many foundries use more core binders and other additives than are necessary. All of these materials have an important place in the production of good castings, but all of the good properties may be destroyed by using too much.

Prof. Howard Taylor, in charge of the MIT foundry, was toastmaster at the conference dinner Friday evening at the Graduate House. Dr. John Wulff, head, Division of Metallurgical Engineering, MIT, told of the progress that has been made in interesting good students in the foundry industry. While a few years ago foundry problems attracted no attention from students, today there are 30 undergraduates preparing their thesis on foundry problems, 20 graduate students are working on their master degrees and 10 on their doctorates in foundry. But Dr. Wulff warned that the students studying foundry problems also should have knowledge of other methods and materials, including welding, forging, powder metallurgy, etc. In conclusion, Dr. Wulff told of the new metal processing building which will contain a fine foundry, and expressed the hope that the facilities of the new foundry might be used for the short course type of conference designed to bring a better understanding of the technical and practical phases of castings production to the men in the plant.

Wallace G. Strathern, director of training, Eastern Gas & Fuel Associ-

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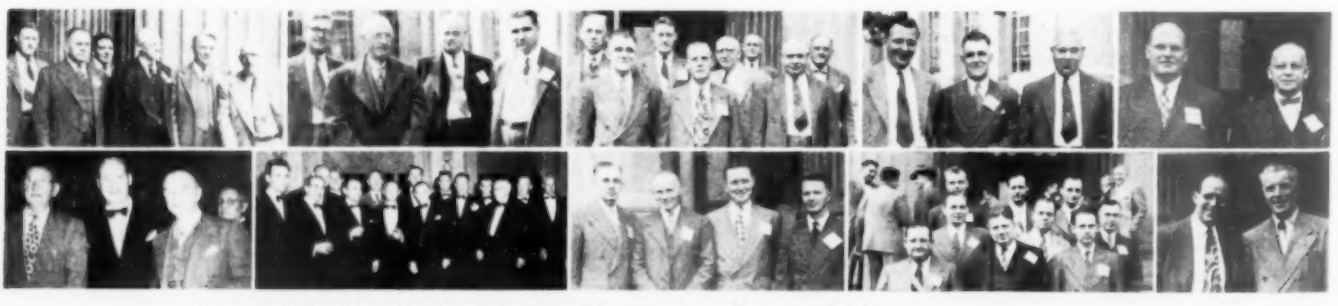

Views of the New England Regional Foundry Conference held Oct. 7 and 8 at Massachusetts Institute of Technology. Photos by C. A. Wyatt, Debevoise-Anderson Co.

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Birdseye view of the Fanner Brookside Park plant in Cleveland

(*Continued from page* 192)

ation, Boston, gave a most interesting and entertaining address on salesmanship, under the title "Standing Still—Or Going Ahead."

At the first session on Saturday morning, Clyde Sanders, vice president, American Colloid Co., Chicago, discussed "Sand — Maine to California." Gordon Paul, Brown & Sharpe Mfg. Co., Providence, R. I., was chairman. Mr. Sanders cited examples of grain distribution and properties of sand from various parts of the country and explained the principles to be followed in securing good castings. Grain distribution has a direct relationship to permeability, and the ratio of coarse and fine grains determines the density. Density of the sand controls the heat conductivity, with low conductivity developing hot spots and resulting in shrinks. Mr. Sanders emphasized that these and other fundamental facts must be understood and used by foundrymen.

Sherman Rogers, Sherman Rogers Publications, Chicago, drew on his own varied and at times rugged experience in presenting an inspirational address at the humanic session on the subject, "Where Do We Go From Here." Howard Nye, Crompton Knowles Loom Works, Worcester, Mass., presided. Mr. Rogers criticized the administration for saying the same things about our country as the Communists, declared that there is not the slightest reason for any of the present strikes in major industries and pleaded for a more intelligent distribution of information on the division of income between workers and stockholders.

Saturday afternoon, B. P. Mulcahy, Fuel Research Laboratory Inc., Indianapolis, presented an extensive study of the construction, operation and the raw materials used in the cupola. William N. Ohlson, Draper Corp., Hopedale, Mass., presided. Mr. Mulcahy pointed out that the cupola is an amazing melting unit, when one considers the extreme range in demands made upon it. Mr. Mulcahy described the cupola and other equipment, the raw materials used, methods of slagging and then devoted considerable time to a rather thorough consideration of cupola fuel.

He stressed the point that as postwar conditions recede, we must not adopt the attitude that coke quality will improve automatically and permanently. Unquestionably, according to the speaker, coke will become better as coal supplies improve, but the best protection can be gained by making the operation of the cupola less dependent upon premium quality coke and by taking full advantage of the benefits to be derived from the other factors involved.

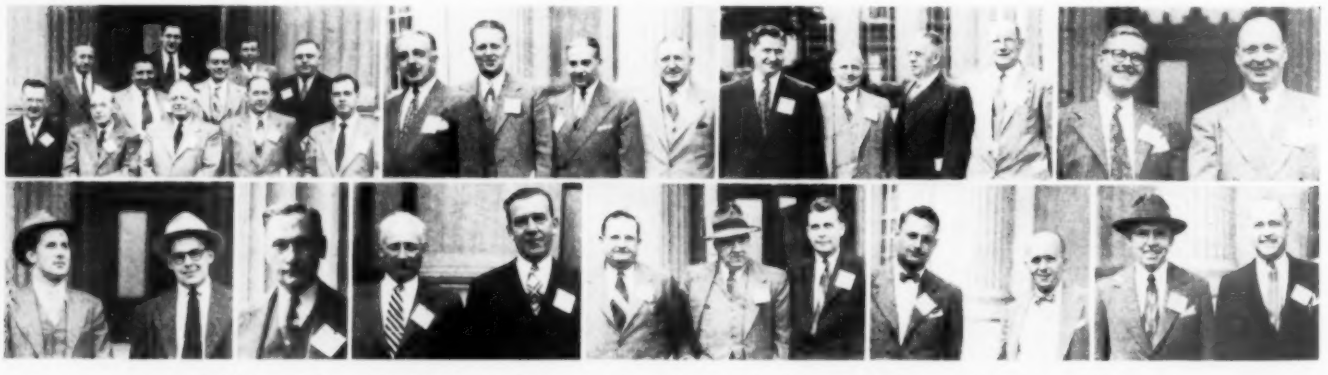
At the nonferrous session Saturday afternoon at which Prof. Howard F. Taylor, MIT, presided, James O'Keeffe, Exomet Inc., Conneaut, O., discussed "Making Pressure Bronze Castings." The speaker showed the design of a standard test bar, the purpose of which was to provide a solid wedge-shaped casting that was completely fed, thus eliminating shrinkage as a factor in any defects that might be indicated by a discolored fracture. The wedge was roughly 2½ in. high, ¼ in. wide at the bottom, 2½ in. wide at the top and 3 in. long. The secret was the feeding of this test block by a riser of ample dimensions that was insulated on all sides and at the top by the use of plaster insulation. The metal was a tin bronze such as 88-10-2. Pouring temperature ranged from 2000 to 2150° F. This large temperature gradient was, in the opinion of the speaker, made possible by the insulation.

In discussion following presentation of the paper, the thought developed that in making a casting with the test wedge as a control, if the fracture was homogeneous, the metal going into the casting was not gassed. If trouble should develop in the casting, it could then be attributed to shrinkage, and risers and chills should be investigated. It was agreed that it is not possible to judge by the fracture whether discoloration is due to shrinkage, gas or both, but with this test wedge, the question of shrinkage is eliminated.

Charles O. Burgess, technical director of the Gray Iron Founders' Society, Cleveland, in the final session of the conference, spoke on production problems associated with nodular irons. Dr. Walter Saunders, Providence, R. I., served as chairman. Mr. Burgess stated that one of the first requirements is a pig iron low in phosphorus and sulphur so that maximum ductility can be developed in the final iron and minimum additions of nodulizing alloys will be required. The available nodulizing alloys were reviewed briefly and the comparative advantages and disadvantages of nickel-magnesium, copper-magnesium and magnesium-ferrosilicon were discussed. Various formulas have been worked out for the correct addition of magnesium using these types of alloys. They are, however, subject to variation depending for one thing on the method by which the alloy is introduced into the molten iron, which should insure as complete and intimate contact as possible of magnesium and magnesium vapors with the iron to be treated.

It was pointed out that gray iron compositions approaching the eutectic have been found particularly suitable for nodular iron. This is due to several factors: (1) the strength of the final nodular iron is not appreciably decreased because of the use of high carbon or a high carbon plus silicon content; (2) these types of iron resist mottling or the formation of free cementite; and (3) eutectic irons retain a high degree of fluidity even at low temperatures, which results in improved casting properties. As a matter of fact, a number of producers have reported that the temperature at the time of the alloy addition is quite critical. For example, some producers consider 2700° F as the maximum at which a nodulizing alloy should be added, and at least one producer considers it worthwhile

(*Concluded on page* 196)



Additional New England Conference views by C. A. Wyatt, Debevoise-Anderson Co.

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(*Concluded from page* 194)
to determine this optimum addition temperature by casting fluidity spirals. This type of temperature control, in the case of cupola iron, obviously would involve tapping at a comparatively high temperature and allowing the iron to cool down in the ladle or forehearth to the optimum addition temperature and reladling. Again, the high fluidity of eutectic irons are of benefit in enabling such irons to be handled at comparatively low temperatures.

Among other factors covered in the discussion were means of reducing sulphur, and methods of analyzing for magnesium to avoid misleading values associated with segregation of magnesium sulphide. Necessity for low sulphur in nodular irons may revive interest in basic-lined cupolas.

Potential uses of nodular iron and existing applications, many still experimental, were covered in detail. The probable impact of such uses on the malleable and cast steel industries was considered to be minor. However, the necessity for the gray iron industry to work as a whole to keep the production of nodular iron in gray iron foundries, where it logically belongs, rather than in other types of foundries, was stressed.

As is the custom, the conference was concluded with a smoker Saturday evening at the Parker House, Boston, under the sponsorship of foundry supply concerns in the New England district. Ray Hunter, Harry Impey and Frank Kumer served as the executive committee. The entertainment committee included Jack Orrok, Chris Wyatt, Jack McCarthy, Charlie Reed, Herb Klein, Bill Slater, Lee Lilley, Ed Taggart, Alex Haigh, H. G. Senning, Bill Duncan, Al Wright, Leroy G. Van Stone, Tom Gowan, Harold Cross, Harry Gibby Jr., Dick Tibbets, Howard Nye and Henry G. Stenberg.

ANNUAL MICHIGAN REGIONAL FOUNDRY CONFERENCE

Attracts Large Registration

By EDWIN BREMER
Metallurgical Editor
THE FOUNDRY

AN EXCEPTIONALLY good turnout, nearly double that of last year, marked the annual Michigan Foundry Conference. Held at the Union building, Michigan State College, East Lansing, Mich., Oct. 28-29, the meeting was sponsored by the Mechanical Engineering Department of MSC in co-operation with the four Michigan chapters of AFS—Central Michigan, Detroit, Saginaw Valley, and Western Michigan. C. H. Jacobson, Dake Engine Co., Grand Haven, Mich., presided at the opening meeting, and Leonard C. Price, head, Department of Mechanical Engineering, MSC, welcomed the visiting foundrymen to the meeting.

First speaker on the technical program, L. A. Danse, General Motors Corp., Detroit, discussed new developments in the foundry and pointed out that certain types of foundry equipment lagged behind developments in other fields—for example, the machine shop. He predicted that in the not too distant future molds would be produced completely by pushbutton control. Increasing agitation for control of industrial smog will compel installation of dust and smoke arresters on all cupolas, according to Mr. Danse, and he mentioned the application of the closed-top type in a foundry in California which permits a 15 per cent saving in coke as well as use of a cheaper grade.

Other developments included in the discussion were use of plastics or resins in bonding molding and core sands, and dielectric baking of cores. With reference to the latter he said that cores 8 x 12 x 18 in. were being dried in an 80-kw unit in 9 to 11 minutes. A quite recent development was use of ceramic materials for both molds and cores (Editors' note—see "U. S. Navy Casting Research" in the November and December issues of THE FOUNDRY). For special applications Mr. Danse mentioned use of steamed plaster molds for intricate aluminum alloy castings, and use of zircon sand molds for gray iron torque converter castings. He also mentioned use of wire shot for blast cleaning, stating that while its cost is hign, its life is long. In conclusion, he urged foundrymen to get together and work for improvements in various types of foundry equipment and methods.

Second speaker was Frank W. Shipley, Caterpillar Tractor Co., Peoria, Ill., who discussed "Producing a Wide Variety of Castings With Extremes in Lot Sizes." Using the foundry of his firm as the example, he said that in 1948 it produced over 3¼ million castings from 4200 patterns. They averaged 35 lb in weight and varied from ½ to 3400 lb, with production lot sizes from 1 to 15,000 per month. For production of those castings the Caterpillar foundry has ten different molding units as well as two core departments.

Largest molding unit for production of cylinder blocks and transmission cases consists of drag and cope conveyors, slinger ramming units, and sand conditioning system. Electrically-driven cars carry cope and drag patterns mounted on power stripping machines set loose in the cars. Molds are sprayed and torch dried to a depth of ⅜-in. Cores are set as conveyor moves along to the closing station. After pouring molds pass through cooling tunnel. Light weight thin section wheel housings, medium size transmission cases and similar castings are made on two identical molding units comprised of tractor sand slingers which pull two pattern cars after them. While one half mold is being rammed, the previously rammed half is removed and placed on the floor where it is sprayed and torch dried.

Another unit is used for producing diesel cylinder heads and is equipped with a roller conveyor and two stationary sand slingers. Track carrier rollers are made in a permanent mold unit. Mr. Shipley included description of several other molding units as well as the two core departments, and then presented detailed information on how scheduling castings is arranged to keep all the foundry units occupied without overloading or bottlenecking.

Walter Gerlinger, Engineering Service Inc., Milwaukee, discussed mechanizing problems and stated that the preferable term is "modernizing" since it actually comprises other phases which might or might not involve such equipment. In modernizing, it is a must to plan properly so that the changes do not become too complicated and expensive, resulting in equipment being inoperative a good part of the time. Cost of the equipment of course, should be considered, and adjustments made. One important consideration is that the arrangement should be flexible to permit easy changes in case other types of work than originally scheduled are brought in. Modernization will eliminate hea-

(*Concluded on page* 198)

HOW TIMKEN® BEARINGS HELP CLEAN CASTINGS

CLEANER, FASTER

This machine is one of the largest barrel type Rotoblast cleaning machines built by Pangborn Corporation, Hagerstown, Maryland. It can handle 28 cubic feet of castings weighing as much as 500 lbs. apiece. The machines are also used to de-scale forgings after annealing.

To offset this very severe service, 30 Timken tapered roller bearings are used on the main (barrel) shaft, supporting end (2) and driving end (2); barrel support rollers (12 rollers, 24 bearings); and clutch (2).

Although the operating speed is low (about 2 R.P.M.) the loads and shocks are terrific, and the ability of Timken bearings to carry all loads — radial, thrust and both together — and to hold moving parts in alignment are important factors of dependable performance and low maintenance.

By reducing friction to the verge of elimination, Timken bearings also assure smooth rotation and minimum power consumption.

Being made of Timken alloy steel — the finest material ever developed for tapered roller bearings, heat treated for toughness and case hardened for wear resistance, Timken bearings normally last the life of any machine in which they are used.

For further information covering Pangborn foundry equipment, write to the manufacturer, Pangborn Corporation, Dept. T, Hagerstown, Maryland. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address "TIMROSCO".

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(*Concluded from page* 196)

vy lifting, increase earnings as well as working conditions, and provide lower costs, uniform production and better castings.

Tom Butler, Ford Motor Co., Dearborn, Mich., pointed out that in modernization the proper layout should be made so that satisfactory maintenance to keep the equipment operating does not become a problem. Walter Hummel, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., speaking about mechanizing with reference to foundry costs said that all personnel concerned should get together to discuss the problem and plan all the detail before purchasing the equipment. Cost of equipment and its installation should be considered as well as various details on number of men, wages, power cost, etc. to determine the differences in old and new methods, and to estimate the time required to write off the costs.

At the noon luncheon Austen J. Smith, head, Department of Chemical and Metallurgical Engineering, MSC, presided and introduced E. W. Horlebein, Gibson & Kirk Co., Baltimore, Md., and national president of the American Foundrymen's Society, who spoke briefly on the activities and benefits of the society.

At the first afternoon session Fitz Coughlin Jr., Albion Malleable Iron Co., Albion, Mich., presided. H. L. Womochel, Mechanical Engineering Department, MSC, presented progress reports on four investigations being carried on at the college. One on the relative effectiveness of some inoculants for gray iron indicated that ferrosilicon is better than calcium silicon, and that in the case of the latter calcium additions alone appeared to give the same results. Another on effect of heredity on properties and microstructure of induction melted iron indicated that there is a difference when different raw materials are used. Those included melts of steel, graphite and ferroalloys; steel and pig iron; remelt plus alloys, and steel and graphite without alloys. Gray iron compositions were adjusted so that analyses were practically the same. In studying oxidation of gray iron melts in the induction furnace, little difference was found whether oxidation did or did not occur.

W. N. Witheridge, General Motors Corp., Detroit, discussed the "Practical and Social Aspects of Cupola Smoke Control," pointing out that from 10 to 50 lb of debris is discharged from the cupola per ton of iron melted, and in residential districts it is becoming more and more necessary to eliminate its dispersion. He showed a number of illustrations of dust arresters of various types, and pointed out that while it is comparatively easy to remove heavy particles, complete suppression of light particles, smoke and gases requires much more elaborate equipment. Decrease in amount of smoke and particles from the cupola stack could be accomplished, according to Mr. Witheridge, by use of electric coke igniters instead of wood, by removing sand adhering to remelt, and keeping the cupola filled instead of waiting until the charges had dropped considerably.

Final afternoon session was under the chairmanship of V. A. Crosby, Climax Molybdenum Corp., Detroit, and the speakers were W. T. Bean Jr., consultant, Detroit, and Frank Tatnall, Baldwin Locomotive Works, Philadelphia. Subject was stress analysis, and Mr. Bean described how better castings could be produced by use of that method. Mr. Tatnall discussed application of brittle lacquer to determine areas where stress is present, and of strain gages to determine the amount of the stress.

At a dinner held Friday evening with L. G. Miller, Dean, School of Engineering, MSC, presiding, Ted Abrams, Abrams Aerial Survey, Lansing, Mich., presented an interesting talk on his recent airplane trip around the world. Saturday morning's session, over which L. L. Clark, Buick Motor Division, Flint, Mich., presided, embraced discussions on mold materials, and on nodular iron. Speakers on mold materials were Harold Austin, Buick Motor Division, and C. A. Sanders, American Colloid Co., Chicago. Mr. Austin described an investigation on the prevention of a draw or external shrink on a specific casting. Elimination of the trouble was accomplished by development of a special molding sand which possessed expansion and contraction properties of such a nature that they counterbalanced the metal shrinkage. Mr. Sanders pointed out that density of the molding sand has an important bearing on whether or not shrinks or draws occur. Dense sand has a high rate of heat conductivity and causes the metal to solidify more rapidly. It also does not deform or permit the mold cavity to enlarge.

Discuss Nodular Iron

In the discussion on nodular iron D. E. Krause, Gray Iron Research Institute, Columbus, O., gave information on properties and methods of production by addition of magnesium or magnesium-bearing alloys. For best properties phosphorus and manganese should be low. He said investigation indicated that nodular graphite could be precipitated in the liquidus as well as in the solidus.

R. B. Melmoth, Ford Motor Co., Dearborn, Mich., stated that nodular iron would not necessarily replace other ferrous castings, but rather would augment them by having special applications. Fred Walls, International Nickel Co., Detroit, mentioned that patents had been granted to his firm on the use of magnesium additions to cast iron which resulted in appreciable amounts of residual or retained magnesium in the iron. R. G. McElwee, Vanadium Corp. of America, Detroit, stated that proper pouring temperature of nodular iron is important in obtaining solid castings. W. B. McFerrin, Electro Metallurgical Co., Detroit, mentioned use of a new ferrosilicon-magnesium alloy in producing nodular iron.

PUBLIC SHOWING: "This Moving World," the color motion picture produced for the Malleable Founders' Society, was shown publicly at the Bohm Theatre, Albion, Mich., Oct. 8. Showings were held at 9, 10 and 11 a.m. and were preceded by short talks by Norman Weiner, mayor of Albion; Coilins L. Carter, president and general manager, Albion Malleable Iron Co., and Lowell D. Ryan, managing director, MFS

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By PAT DWYER

Drawings by RICHEY

ADVENTURES OF Bill

DO you think," Bill inquired the other night, "that there is anything in this here now claim put up by certain people that they can appraise a man, or woman, by his or her handwriting? They can fit you into the exact niche for which you particularly are adapted. They analyze your tastes, your inclinations, your desires, your ambitions, your political and literary views—if any—and whether you are a nibbler, or a good hefty trencherman when the call goes out 'Come and get it.' They can tell you whether you are plain and blunt in your intercourse with others, or if you are a slicker and a smoothie.

"The analysis usually is all to the good. You commence to wonder if you really are as wonderful as the diagnosis indicates. If, as you are inclined to believe, you are such an outstanding character, how is it that the boss and other people have not told you about it before? There seems to be a bit of a cloud in the otherwise clear and limpid beauty of the sky. Have you ever had a short or long distance interview with one of these super-doopers who see all, hear all, know all and are ready to spill the stuff in small gobs for a fee which ranges from a dime to a dollar, depending on where and how the job is done."

"Dear Sir," I said, as prescribed in *What Every Young Man Should Know About Writing Letters*. "Replying to your earnest, interesting and soul-searching inquiry of recent date, the answer is yes and no. The no is for the first part of the last sentence. The yes is for the first sentence in your presentation. I won't go so far as to say that a man's writing gives a complete clew to all his characteristics. Counterfeiters, forgers, embezzlers and other A-1 crooks usually write a beautiful hand, showing that they love children and dogs, the bees and the flowers. On the other hand, many eminent men, salt of the earth, hearts of gold and all that kind of thing, write a crooked, crabbed hand that would stymie their own mothers. All the king's horses and all the king's men could not untangle the mess."

"Pray tell me," Bill interrupted, "when did the king's horses learn to read and write? In fact, I have known some of the king's men who were not so hot with a pen. My uncle Malachi knew one of these lads in his early wanderlust days, who could and did spell a word in half a dozen different ways, and all of 'em wrong and off the target."

"By a curious coincidence," I said, "I learned the other day of a handwriting puzzle in this very galley where I pull a daily oar."

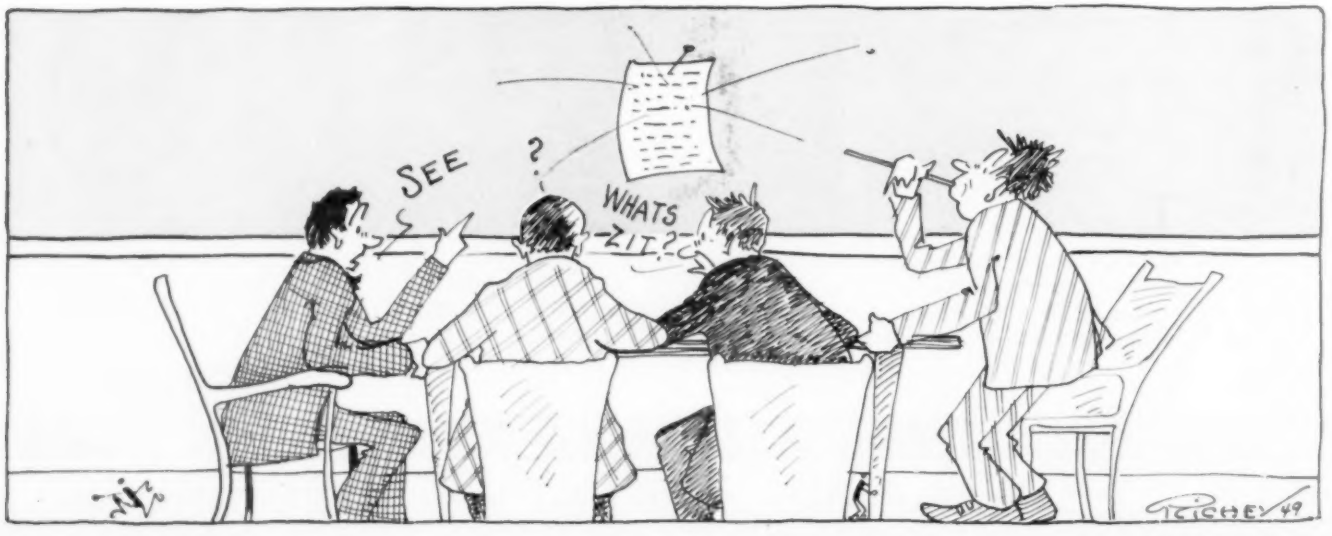
"Meaning, you think you are working?"

"Which the answer to the same, podner, is a simple and dignified yes. Tranquility of a dove cot on the opposite side of the building, was shattered no end the other day by the signature to a typewritten letter addressed to Ye Ed. After turning it upside down, end for end and in front of a mirror, he announced to one and all it was the most remarkable example he ever had seen. He was tempted to do one of his vitriolic editorials on the subject, but decided it was too hot to touch. Other members of the staff gazed on the display with mingled awe and admiration. Basing an opinion on what looked like a capital *D*, their guesses on the identity of the writer ranged from Dracula to Dopey.

"One able graphologist, who was up in the front row when diameters and circumferences were given out, solved half the problem. Modestly he admitted he could not exactly make out the writer's name, but the character of the writing, a complicated series of whirling lariat loops indicated a western or Zane Grey heritage. In a long, but withal scholarly written opinion, this amateur Sherlock Holmes submitted the following analysis:

"'Mr. With The Well Concealed name, quite definitely is a positive type individual, a life is real, life is earnest kind of a bird who makes up and watches the budget at home. I'll gamble, or rather I should say, I am willing to stake my professional

(*Continued on page* 202)



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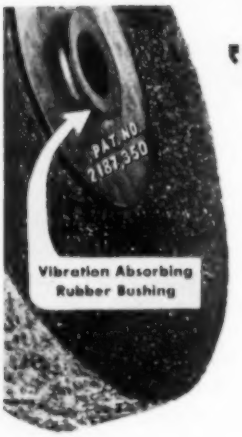

The Vibration Dampener Bushing in Manhattan Abrasive Wheels for portable grinders is a boon to man and machine. This patented center core of rubber absorbs the chatter of high-speed grinding, saves wear and tear on the worker's wrists and arms. This means many hours more of effective production, fewer hours lost through fatigue.

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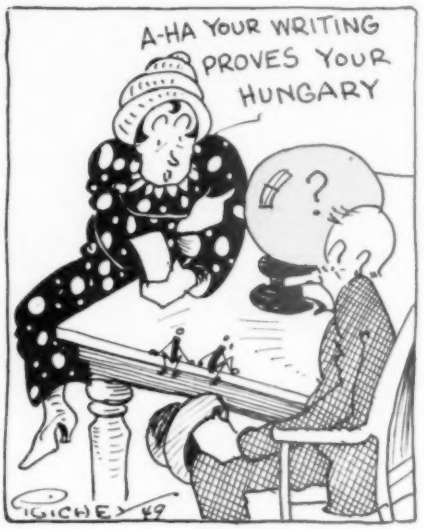
(*Continued from page* 200)

reputation, that his meek little wife makes few moves without his pompous consent and approval. Undoubtedly, he has artistry in his nature, but his positiveness—if there is such a word—conflicts with the accuracy of his judgment. Should that be the other way around? Well, you know what I mean. He is inclined to be arbitrary and expects there will be no question as to the outcome of his suggestions. The good old icy eye, and so what? He does not check things up very carefully, because he assumes that all matters are settled once the oracle has spoken. He is personally aggressive, but leans toward conservatism in public and



Lady spills a little double talk

semipublic relations. He is about 55, well built, ruddy complexion, hair thinning and combed straight back on top, fond of the good things of life.'

"Hawk-Eye Jemina, foundry expert and the only living person who can decipher editorial hand writing said 'Pooh!' Just like that. 'Here's the man's initials,' she said, 'neatly typed in the lower left corner. Here's a name with the same initials among the list of officers at the top of the sheet. The man's name is H. H., probably High Hat!'

"Some time later I met a man who knows H. H. quite well. 'H. H.,' says he, 'is a pale, dyspeptic, little mouse-like creature, about 5 ft high when stretched to the full elastic limit, and weighs 102 lb when fully inflated with lettuce, leaves macaroons and bicarbonate of soda. Otherwise your graphologist's interpretation is remarkably accurate.'

"I am looking forward with a great

(*Continued on page* 204)

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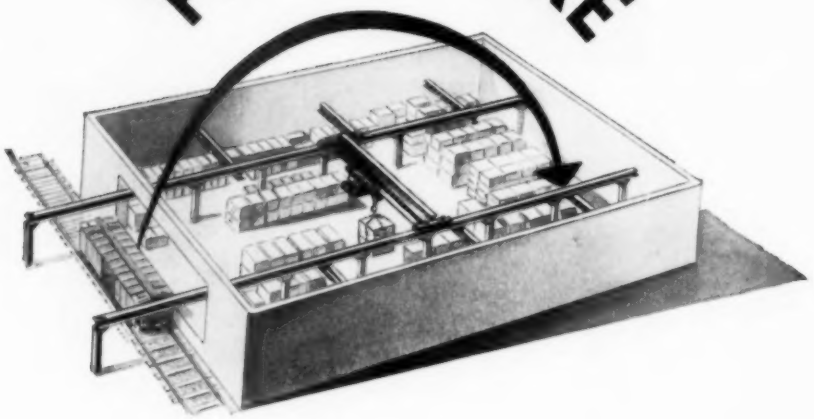

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(*Continued from page* 202)

deal of pleasure and anticipation to further contributions from the trusty and nimble pen of an able writer whose light, too long, has been concealed under a bushel. O, all right. Two bushels."

"While you are waiting," Bill said, "you may be interested in some correspondence I had with a young engineer about a year ago, or maybe a little more. Why haggle over a few months? Here is the beginning: 'In the July issue of THE FOUNDRY there are several references made to dry sand molding. Apparently this subject was carried in the February and March issues. Unfortunately, the copies no longer are in our files. We would like very much to have these articles and also any other references which you may know of on this subject.'"

"A truly modest request. I suppose you immediately spit on your hands, girded up the loins, dusted off the microscope, donned the trusty fore-and-after checked cap, dived into the *Slough of Despond* and came up with the quivering answer firmly grasped in both hands."

"You remind me," Bill said, "of a little quip I saw some place the other day. A not too bright student turned in an examination paper on which he had not written a single answer. On the bottom of the page he wrote 'God knows the answers to these questions. I don't.' The dear old professor dipped his pen into the usual mixture of vinegar, gall and wormwood and notified the witty one 'The Deity (In absentia) is awarded an *A*. With charity for all and malice for none, the best I can do for you is a capital *F*.'

"Instead of following your long and useless rigmarole, microscope, fore-and-after checked cap and all that kind of thing, I laid the proposition before our beautiful and highly competent Dolly Varden, which is just another way of saying I outlined a diplomatic reply. She knocked off the warts and bunions, sand papered some of the rougher corners and sprinkled commas, periods and so forth here and there. She let me have a look at the finished job and I assured her she was getting better and more good looking all the time. That is one of the advantages of old age. A little banana oil never is regarded as a declaration of intention, or a road sign pointing to wreaths and orange blossoms. Here is the document:

Maybe it is the weather, or the general vacation atmosphere that pervades the premises at this time. Whatever the reason we find ourselves unable to reply to your recent

(*Continued on page* 206)

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(*Continued from page* 204)

inquiry without further information. What is the title or page number of the article to which you refer as appearing in the July issue. Are you referring to the series of articles on aluminum foundry practice by Floyd A. Lewis, which ran continuously from Jan. to Nov.? The principal flaw in that guess is that the installment in the July issue deals with permanent (metal) molds. Your second paragraph also presents quite a hurdle. 'We would like very much to have these articles and also any other references which you may know of, on this subject.'

Mr. Seeker! Dear Mr. Seeker! (Which of course is not the name in the letter) THE FOUNDRY has had a continuous existence for almost 60 years. During that period probably thousands of references to dry sand molding practice have appeared in its pages. Many references also have appeared in the *Transactions* of the American Foundrymen's Society and other technical publications.

We are not infallible in our interpretations, but we are reasonably certain this phase of foundry practice is not what you have in mind. Give us the title and page in the July issue and we shall be pleased to furnish any available information. Nothing could be fairer than that.

"Replying to this letter, he enclosed a page illustrating a wide variety of small cores designed for stack molding. Primary object of the display was to direct attention to the use of a binder made by a prominent core oil manufacturer. Another page, taken from the *Question and Answer* section of THE FOUNDRY had reference to two former articles dealing with stacked core molds.

The enclosed pages, he wrote, will explain the type of information I need. This method may not be at all adaptable to our foundry, but with a sketchy description perhaps you readily can decide whether we should investigate further. Primarily we are interested in quality castings rather than quantity, within an economical ratio. We cast nonferrous metal in small job lots 50 to 100 pieces. Casting weight varies from ¼ to 5 lb. We use matchplate and loose patterns in hand rammed molds. Metal in 30-lb pots is melted in two gas fired furnaces. We have considered the installation of a small squeeze jolt molding machine, but up to the present are not convinced it would be a paying proposition.

"Now that you had the green light," I said, "I suppose you brought the old toe down heavily on the pedal and zoomed away merrily over hill and dale, like young Lochinvar."

"Lochinvar, hey? Wasn't that the lad who whirled his girl off the dance floor, swung her to the top of his horse, jumped up himself and flew out of the yard before the old man could get his shotgun? Well, I am not as young and nimble, or as ambitious, as this here now gay caballero, but with the technical assistance, as outlined heretofore, I knocked out the

(*Concluded on page* 208)

WE at Woodward take the opportunity of this approaching Christmas season to voice again our deep appreciation of the close relationships of many years past with our good friends in the foundry trade.

We hope the New Year will hold for all of you a full measure of prosperity.

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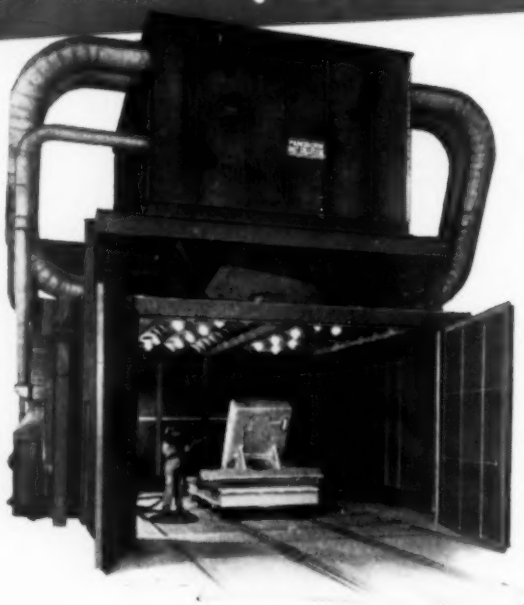
clean large castings *Faster!*



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Pangborn AIRBLAST Cleaning Rooms are designed for *fast cleaning* of intricate castings . . . work may be handled by rotative table, car, monorail conveyor or hoist. Doors are free swinging, hung on an angle to clear obstacles on floor when opened!

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Pangborn AIRBLAST Rooms assure maximum cleaning per man-hour. Brilliant lights within the room make work easy-to-see, easy-to-clean. Exclusive downdraft ventilation keeps dust out of operator's line of vision, helps him work faster.

➡ SAVE ABRASIVE

Mechanical abrasive recovery collects, cleans and sorts used abrasive, then returns it to blast machine.

Pangborn AIRBLAST Cleaning Rooms are built to fit any special cleaning need . . . where you want thorough cleaning of inside and outside surfaces of castings. For complete information on AIRBLAST Cleaning Rooms, write to: PANGBORN CORPORATION, 2300 Pangborn Blvd., Hagerstown, Md. *Look to Pangborn for the latest developments in blast cleaning and dust control equipment.*

More than 25,000 Pangborn Machines serving industry

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BLAST CLEANS CHEAPER

with the right equipment for every job

(*Concluded from page* 206)

following reply:

Perusal of your recent letter shows that you and I were thinking of two different subjects. If you had said *stacked molds* instead of dry sand molds, the misunderstanding would not have occurred. As with practically every trade or calling, the foundry industry has its own nomenclature. Dry sand molding refers to a method in which the mold is made in the ordinary manner from damp molding sand in a steel or iron flask and dried in an oven. Where a mold is made in core sand, with or without a flask, it is termed core molding. Where several cores are built into a stack, the process is known as stack molding. The process is not confined to cores dried in an oven. In many instances green sand molds in shallow flasks are stacked 8, 10 or 12-high and poured in that position. The object of course in either method is to increase production on any given floor space. The number of flasks also is reduced since the bottom face of one mold section serves as the cope for the drag immediately beneath.

I do not think stack molding would be of any particular advantage in your case because: 1—Presumably you are not cramped for room. You can spread the small number of molds on the floor. 2—The system is worked to advantage only where one side of the mold or core block is perfectly flat. Under separate cover I am forwarding three copies of THE FOUNDRY containing articles on green and core stack molding, February, 1948, page 76; May 1942, page 100; March 1943, page 88.

Malleable Casting Advantages Cited

Maumee Malleable Castings Co. has recently published an 8-page brochure which describes the dependability of malleable iron castings and pictures the expanded facilities of its plant in Toledo, O. Photographs show operations in various stages of casting production and illustrate 44 typical castings produced by the company. Maumee is producing a wide range of castings ranging from a fraction of a pound to 200 pounds.

Publishes Catalog

Wellman Bronze & Aluminum Co., 2525 East 93rd St., Cleveland 4, has published a new catalog describing its nonferrous castings and wood and metal pattern operations. It covers such subjects as magnesium, aluminum and copper-base alloys; polishing of aluminum; shrinkages on patterns; typical company castings, and other information pertinent to the production of magnesium, aluminum, brass, and bronze castings. Tables give chemical compositions and mechanical and physical properties of the metals used in the company's castings.

"QUALITY INGREDIENT"

(*Continued from page* 78)

duties of the writer took him into many foundries around the country; sometimes seeking new sources of supply, other times to try to help the supplier out of some of his difficulties. The conditions encountered were at times rather amazing, revealing a lack of judgment used in placing work totally unsuited to the foundry and organization involved. On the other hand, there were brilliant examples of both production and quality achievements where the conditions were fitted to the requirements of the product.

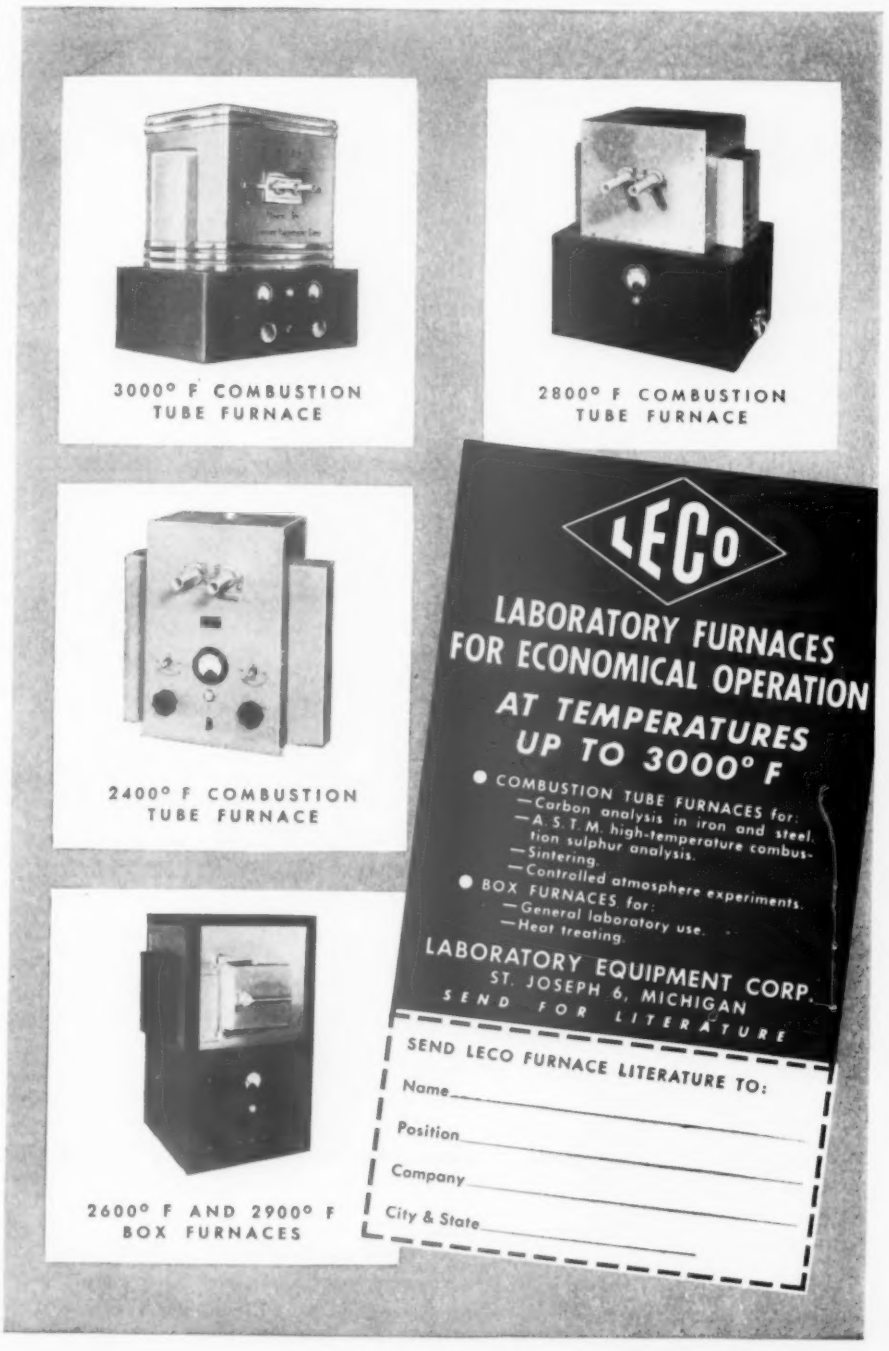
Having been in the foundry end of the automobile business most of my life, I have been exposed to many of the trials and temptations that come to the average foundryman. I know how prone he is at times to take in most anything to fill the empty floor space and keep the cupolas or furnaces at capacity. I know from past experience how unwise it may be to attempt work that does not fit. My point is that foundrymen too often gamble on their ability to produce quality castings without knowing all the facts and the past history involved. The wise operator knows the limitations of his plant and organization. A high percentage of rejects not only is costly financially, but hurts the morale of the organization and the reputation of the company; so it is generally better for both buyer and seller to choose with care.

Now quality in castings depends on several factors. In the writer's opinion, the following are some of the more important: Selection and control of materials used; process control; suitable equipment and tools and their maintenance; management policies and the attitude and alertness of the organization. It seems unnecessary to say much about the selection and control of materials; uniformity of product requires uniformity of the materials going into its make-up. Here again the importance of putting metal of the proper composition into a particular casting should be emphasized.

In the selection of equipment and tools, the extent of the outlay depends in a measure on the specifications for the part, its complexity, tolerances allowed, number of pieces to be produced, tonnage, prices etc. For instance, cylinder blocks and heads of complex design generally require core setting fixtures, target gages and water testing equipment. Keeping the pattern and flask equipment and molding machines properly maintained is important also in holding down the number of rejects. Often the problem of successfully casting a proposed design, from the standpoint of insuring high quality and economy, starts on the drafting board. At this stage, the advice of an experienced foundryman can be of immense value. He should also be consulted as to the way the pattern equipment should be made, especially if he is going to make the castings. Frequently the method of gating a casting is subject to differences of opinion. Where the expense is warranted the use of the x-ray will give quick aid in making the proper gating design. Also, it may show the location or extent of feeding required.

The designer, foundryman and tool engineer should get together on the placement of the locating points for machining. They should be so placed that the foundryman can maintain their accuracy with reference to the

(*Concluded on page* 211)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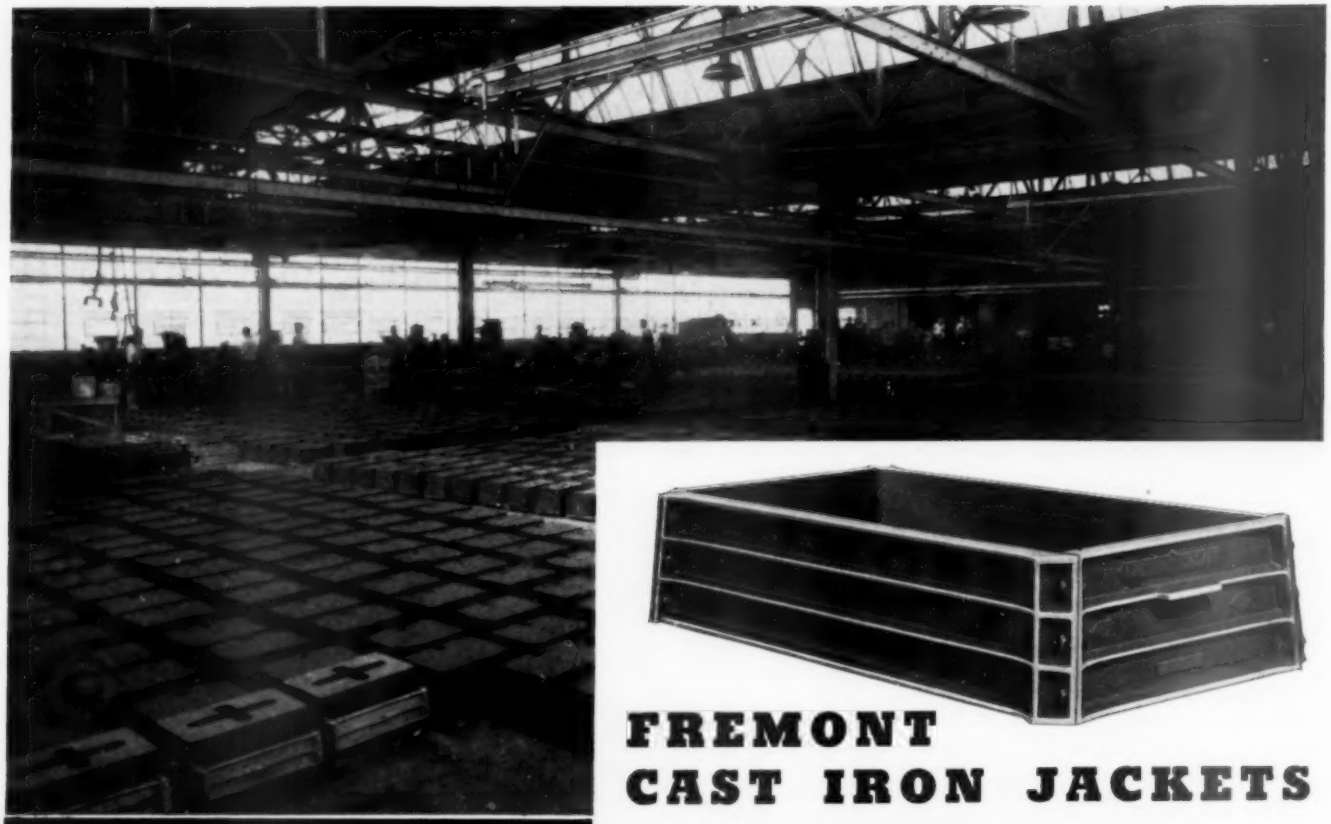

Wells Mfg. Co.'s new foundry in Skokie, Ill. Its 28,800 sq. ft. of floor is well covered by Fremont cast iron jackets and magnesium flasks. They're standard equipment.

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GROOVLOCK
THE FOOL-PROOF PIN

THE FREMONT FLASK CO.
Fremont, Ohio

(*Concluded from page* 209)

entire casting, As a rule, cores are set and located in drag half of the mold usually in reference to the flask pin holes. It is desirable, therefore, to have the locating points on the casting in the drag half. The same spots should also be used for setting up the casting in an inspection target fixture. Many castings are scrapped in the machine shop due to swelled, chipped or misplaced (especially on a cored surface) locating point.

As previously mentioned, the foundry process is inherently one in which many variables have to be dealt with constantly. These must be recognized and controlled. The extent to which they must be dealt with depends somewhat on the type of castings being made. For instance, the variation in the moisture content of the air going into the cupola blast is familiar to all of us. Its control is so important to some foundries (piston ring) that special and expensive equipment is used for maintaining the dryness of the air within predetermined limits.

Section Thickness Varies

Sometimes in a casting where the sections vary in thickness from one to another, a thermal analysis to determine the different cooling rates is helpful. Too wide a differential in the cooling rates of the different sections of the same casting can be disastrous from resulting warpage and cracks. In some cases, special heat treatment is necessary to compensate for the above conditions.

Again, many types of castings are sensitive to variations in pouring temperature and pouring rate. Often the optimum conditions in both the above factors can be determined and controlled. In such castings as pistons, diesel cylinder liners, cylinder heads, blocks, pump bodies, etc., porosity is a frequent cause of complaint. This defect can be caused by any one of several factors, such as unsuitable gating, improper feeding, too high a content of phosphorus, poor venting, incorrect pouring temperature or rate; or the pattern may not be designed for the best method of molding. Corrective measures are a matter of analysis, experience and often "cut and try" methods.

The use of a sand with suitable properties to the castings involved, and the close control and maintenance of those properties is a "must" of first order in promoting the quality ingredient.

The scope of this discussion does not permit the coverage of a long list of factors to be watched and controlled in achieving and maintaining "quality." But, I believe, the above citations are good examples for the necessity of close control.

Diverting from the technological aspects, one of the prime factors in realizing the necessary controls in good foundry practice is an alert and quality-minded organization. Accurate records in all departments of each day's operations, giving all essential facts, are vital in running down troubles. Important castings should be dated for reference. Castings made specially for diagnosing and correcting defects should be marked in a way to differentiate them from regular production. Not too many remedies should be tried simultaneously on the same casting or else the particular variable causing the defect may be difficult to trace. A well-trained inspection department will be continually on the lookout for abnormal quantities of rejects and immediately advise the responsible supervisors. Constant contact with a customer's machine shop is a valuable aid to the foundry, especially where large floats of stock are carried. Foundries using a large and varied quantity of cores will find it economical and a help in keeping down the percentage of defective castings to maintain a core inspection group. This is especially true where important core assemblies are used in quantity production. The use here of special gages and fixtures is recommended.

There is always a percentage of defective castings to be expected in a run due to carelessness or to some variables getting out of control. However continual vigilance, close follow-up and constant attention to the essential details necessary to the successful production of a given casting will aid greatly in achieving or maintaining quality.

The technology of the foundry industry has made tremendous advances since the early days of this century. The machines, tools and instruments available to the foundry processes today are manifold in purpose and number. Volumes have been written on almost every phase of the foundry practice, usually from the experiences of men in the game or from research. The interchange of knowledge among foundrymen is general and widespread. While there is perhaps no substitute for experience, there are many channels of help available to the man faced with a tough casting problem. This is an age of specialists. Even the common and familiar sands used in the foundry have furnished enough problems to set up men and laboratories to diagnose and correct the troubles caused by sand. Qualified metallurgists are available to advise in metal and melting problems. Keeping abreast of progress is an important element of "know how."

Century Foundry, 3727 Market St., St. Louis, suffered fire damage Sept. 11 estimated at $4500.

NATIONAL FOUNDRY ASSOCIATION held regional meetings at the Cincinnati Club, Cincinnati, Oct. 5, with R. J. Redmond, Buckeye Foundry Co., Cincinnati, presiding, and the Athaneum-Turners, Indianapolis, Oct. 6, with Lewis N. Essex, Golden Foundry Co., Columbus, Ind., presiding. At both meetings I. Richards Wagner, president, Electric Steel Casting Co., and L. E. Roark, NFA executive vice president, were principal speakers. Top view is of the Indianapolis meeting, with the Cincinnati gathering shown below

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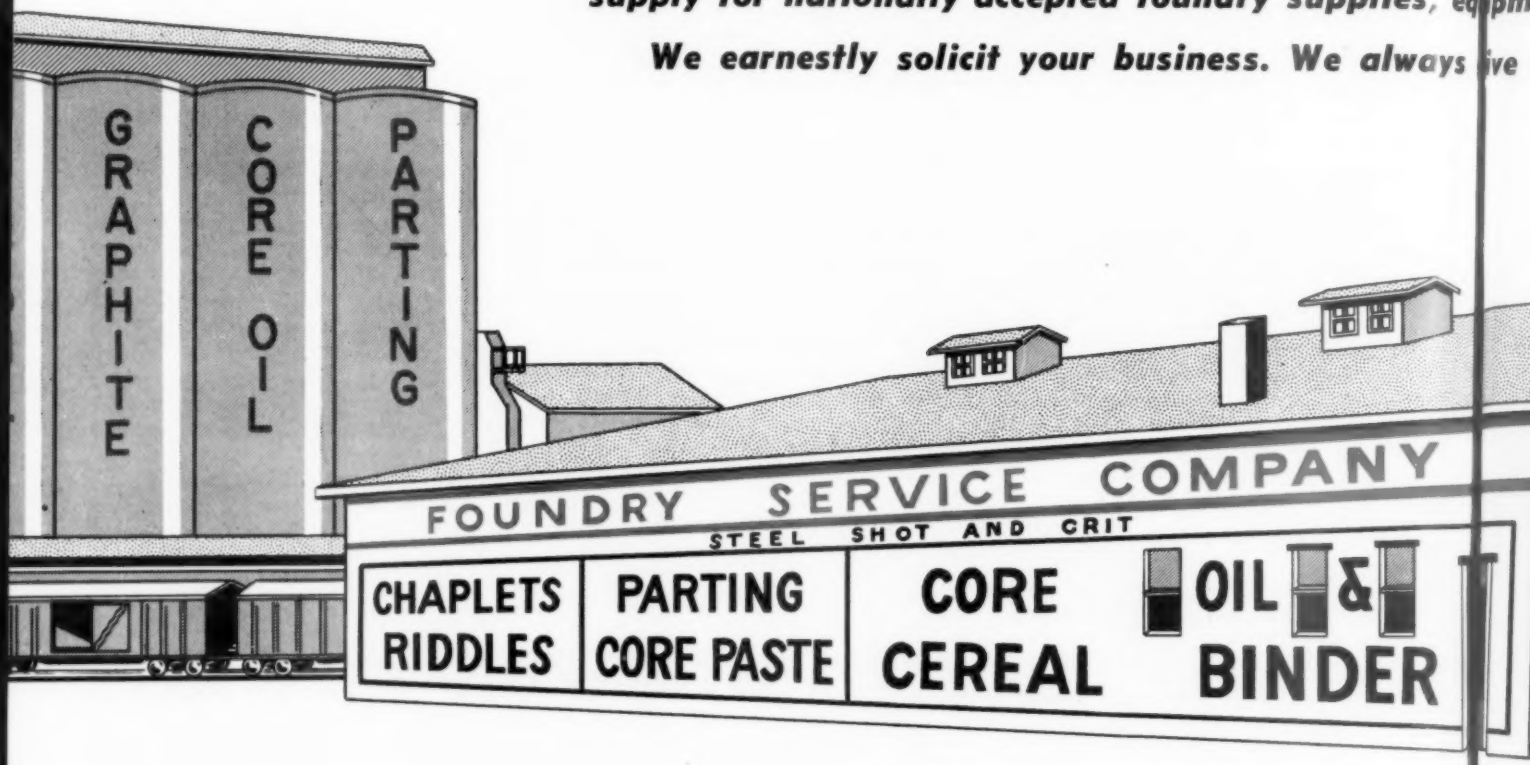

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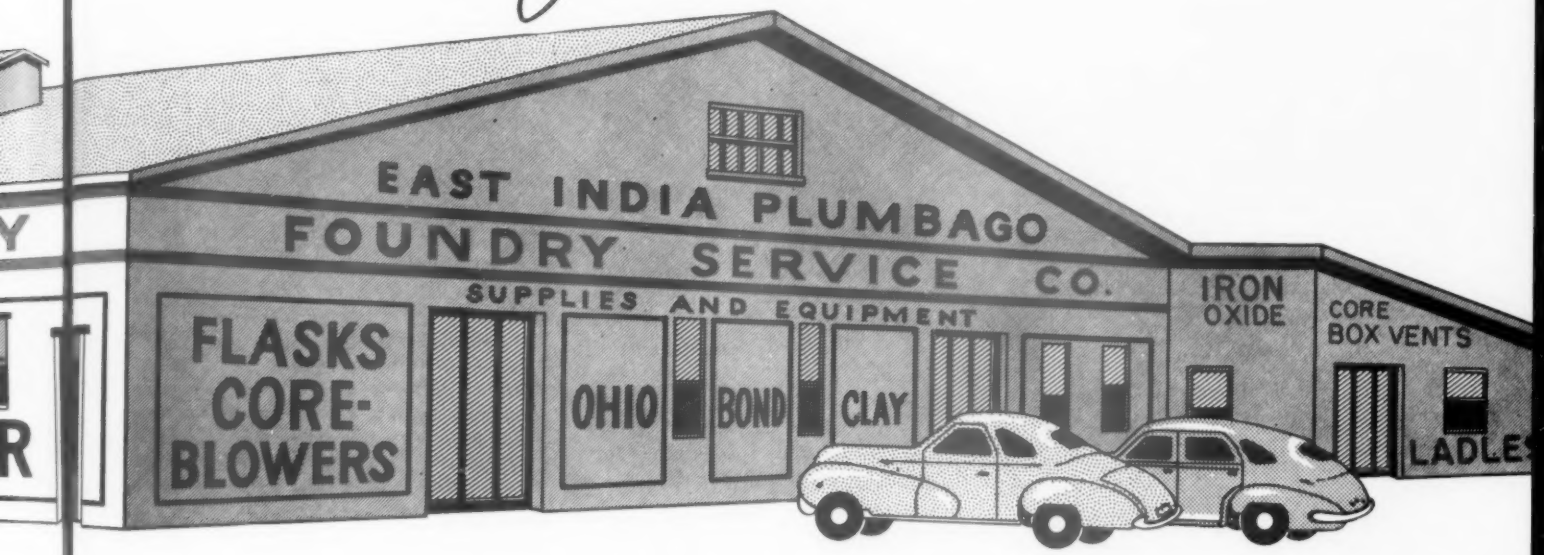

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STEEL FOUNDERS' SOCIETY

Holds Annual Fall Meeting

By FRANK G. STEINEBACH
Editor
THE FOUNDRY

ONE of the most successful fall meetings of the Steel Founders' Society of America, judged from attendance and interest in the three business sessions, was held at the Greenbrier, White Sulphur Springs, W. Va., Oct. 3 and 4. Program of the meeting was built around the activities of the Advertising and Public Relations Committee, the Product Development Committee and the Technical Research Committee.

In opening the meeting, Thomas H. Shartle, president, Texas Electric Steel Casting Co., Houston, Tex., and president of the society, recommended that the management of each steel foundry give careful consideration to intelligent and profitable selling, intelligent and profitable operations, intelligent and profitable management, and to the development of a method or system of individual job estimating and costing for the purpose of profitable pricing.

Publicizes Its Product

Warden F. Wilson, general sales manager, Lebanon Steel Foundry, Lebanon, Pa., and chairman of the Advertising and Public Relations Committee, stated that the society is using direct mail, publicity, and publication advertising to reach design engineers with the facts on steel castings. Mr. Wilson reported on the exceptional success of the display panel in developing inquiries for steel casting data from undergraduate engineers, and stated ten more panels have been purchased in order that the display schedule for the year may cover approximately 100 engineering schools. In connection with the public relations work, Mr. Wilson stated that a large amount of material on steel castings had been published in a sizable number of business and technical magazines. Much of this material was on display in the meeting room.

T. F. Dorsey, president, Pittsburgh Steel Foundry Corp., Glassport, Pa., presented an interesting report on the work of the Foundry Educational Foundation, and its relationship to the society. Because it is believed that future foundry executives and supervisors must come from college trained men, the foundation is interested in training young engineers in the fundamentals of foundry practice so that they may be interested in becoming connected with the industry. But perhaps the greatest benefits come from familiarizing student engineers with the foundry industry and its product, since these young men will go into various industries and eventually may become foundry customers. Mr. Dorsey told of the drive for funds now being conducted by FEF, and urged financial support on the part of all steel foundries.

A. J. McDonald, vice president, American Steel Foundries, Chicago, and chairman of the Product Development Committee, presented a progress report on the product development program. As a means of expanding the use of steel castings, the committee has recommended the organization of District Product Development Committees; the organization of sales groups similar to the technical and operating groups; the establishment of numerous quality standards for steel castings; the development of standard procedures for welding steel castings, and the employment of a full-time product engineer by each foundry as a means of studying design and production procedures.

A product development forum was held after luncheon with Mr. McDonald presiding. Speaking on "Sales in Product Developments," Claude L. Harrell, vice president and sales manager, Sterling Steel Casting Co., East St. Louis, Ill., recommended that foundries produce castings of highest quality with regard to specification, soundness, machinability, appearance and trueness to pattern; that they employ salesmen with foundry training and a good technical knowledge of steel castings; that they maintain closer contact with the customer's engineering department, and that quality and service be the talking point of salesmen.

Robert B. Cottrell, chief mechanical engineer, American Steel Foundries, Chicago, discussed "Role of the Engineer in Product Development." Mr. Cottrell recommended that the industry start selling "Engineered Steel Castings," castings designed to suit the requirements of the machine in which it is to be used or the type of service for which it is intended, and which is best suited to the customer's facilities for production. The speaker drew from his own experience of over 35 years in the foundry industry to show what can be accomplished through this type of service to the customer. In conclusion, he stated that the production of engineered steel castings requires constant study from both design and manufacturing standpoints, so that further beneficial changes may be developed and incorporated in the foundry production process.

J. F. Lacey, works manager, Commercial Steel Casting Co., Marion, O., and chairman of the Technical and Operating Committee, discussed "Technical and Operating Role in Product Development." The speaker pointed out that for a number of years, the T. & O. groups have provided a ready source of information on both equipment and materials. Information on the best technical and operating methods and procedures has been available through these same sources. Use of these sources by all foundries will be a great aid in the work of product development.

Management Has Job

Cleve H. Pomeroy, president and treasurer, National Malleable & Steel Castings Co., Cleveland, discussed "Management in Product Development." He indicated that it is management's job to inspire the men of the organization, to level the barriers that exist between departments, to determine that the work of product development is in capable hands, and to see that the product development, technical and operating, technical research and sales programs of the industry are used to the fullest extent by the company. Mr. Pomeroy paid tribute to the work of the Foundry Educational Foundation in interesting well qualified graduate engineers into the foundry industry and its products.

In concluding this forum, W. J. Phillips, director, Product Development Department, SFSA, discussed present marketing problems and future sales possibilities for steel castings.

The session on Tuesday morning was devoted to a forum on the practical application of the SFSA research program, with C. L. Heater,

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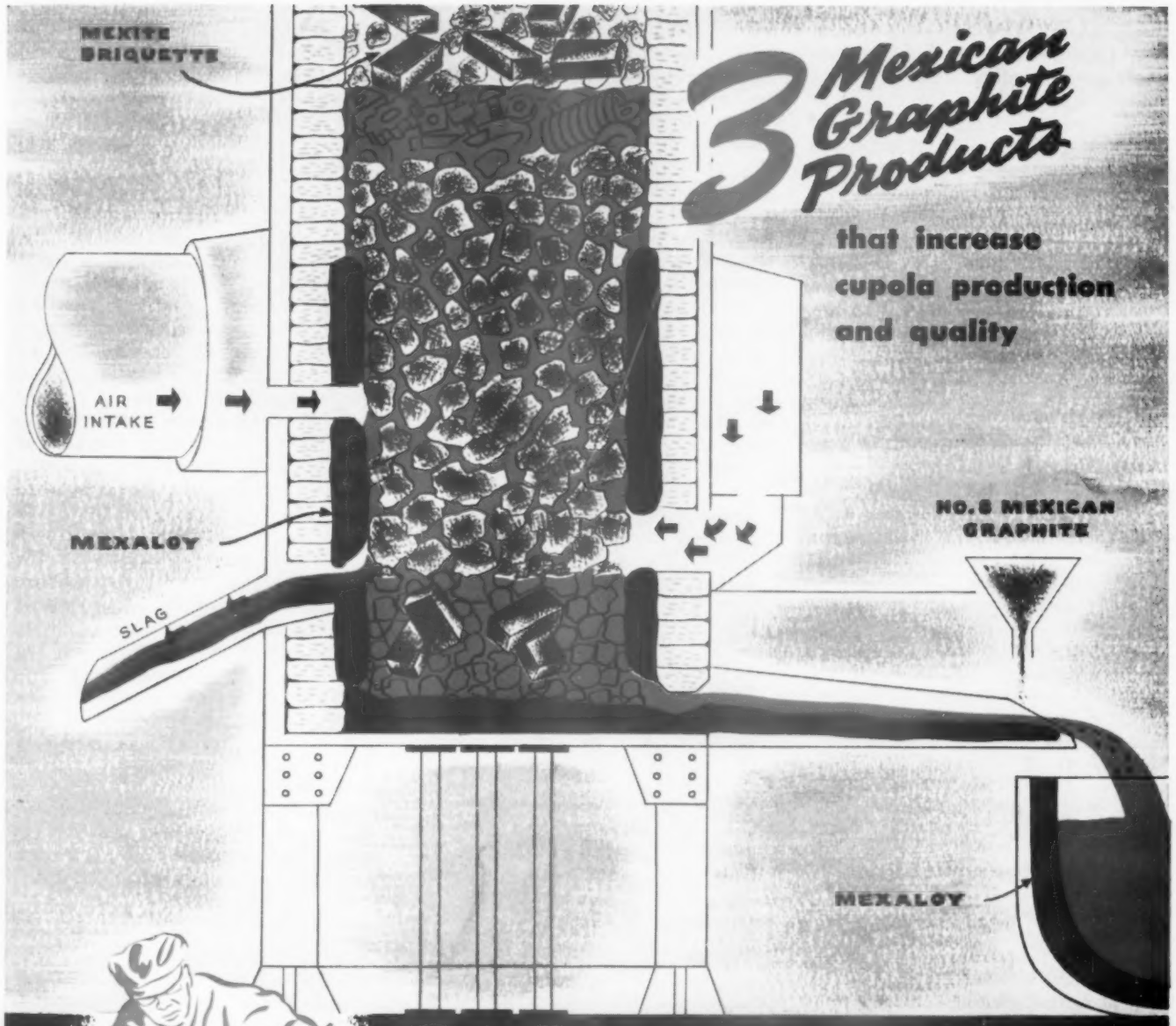

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MEXITE BRIQUETTES. One 4-lb. Mexite Briquette provides the same carbon content as 50 lbs. of pig iron when introduced into the cupola charge. Not only do Mexite briquettes sharply reduce melting costs per ton; they also reduce the range of carbon content fluctuation and give a steadier carbon analysis, a particularly vital factor when high percentages of steel are charged.

MEXALOY, applied to cupola linings, ladles, and spouts, resists molten metal and slag and keeps metal free from refractory inclusions. Its natural lubricating action provides low friction surfaces which part easily from metal and slag. A Mexaloy mixture is easily applied to any clean surface. Because it will not melt or change character under intense heat, Mexaloy gives longer refractory life with lower maintenance cost.

NO. 8 MEXICAN GRAPHITE is used for ladle additions to treat grey cast iron. Trickled into the cupola spout as metal falls into the ladle or with a direct ladle addition, it greatly reduces chill and hardness, producing castings of increased machineability. Normally only 2 lbs. of No. 8 need be added per ton of molten metal—a cost of only ten cents per ton—to assure castings which require no annealing. Write today for complete information on how Mexite Briquettes, Mexaloy, and No. 8 Mexican Graphite will give you better castings for less money.

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(*Continued from page* 214)

vice president, American Steel Foundries, Chicago, and chairman of the committee, presiding. Each of eight speakers, all members of the Technical Committee, discussed one of the society's research projects and indicated the value to the company using the data, either in terms of money saved or improved product.

Paul H. Stuff, Ross-Meehan Foundries, Chattanooga, Tenn., in considering the surface finish of steel castings, referred to research report No. 8, "An Investigation of the Value of Low Temperature Ceramic Glazes as Mold Washes," and research report No. 18, "An Investigation of the Surface Finish of Steel Castings." In the first study it was found that a mold wash, to be of real value, must have base materials that are highly refractory in character with a minimum amount of bonding agent to secure adherence of the wash to the mold surface. In the second investigation, examination of the degree of surface smoothness and surface conditions of the experimental castings indicated that no significant differences were obtained by the application of 11 proprietary mold and core washes, and all gave equally good results.

Improve Casting Surface

It was also determined that use of a mold wash is beneficial in production of steel castings in improving average surface smoothness, minimizing the occurrence of surface defects, and facilitating casting cleaning, with the beneficial effect marked only at critical casting locations. The research also indicated that metal penetration cannot be correlated in any simple manner with a single variable, such as mold wash, grain size of sand, pouring temperature, gating practice, mold hardness or mold dryness. The studies indicated that one of the other major variables is gas pressure.

Dr. F. H. Allison Jr., United Engineering & Foundry Co., Pittsburgh, in a paper read by Mr. Heater, discussed research report No. 15, "Importance of the As-Cast Structures of Cast Steel and Its Effect on Subsequent Structures as Produced by Heat Treatments." The author stated that while microstructures have been studied for 50 years, the work has been confined to rolled or forged steel. Consequently, when the metallurgist of a foundry customer looks at a steel casting, he judges the microstructure entirely on the basis of his wrought steel background.

The study shows that the whole system of cast steel microstructures fits neatly into a regular and easily understood grouping based on cooling rates. The "as-cast" structure has been found to have little influence on the subsequent annealed mechanical properties, nor does the shakeout temperatures from 2000° F, 1600° F, or room temperature make any particular effect on these properties. Results of the research have been used for meeting grain size control specifications, to correct heat treating operations and to eliminating unnecessary treatments.

Dr. Harry A. Schwartz, National Malleable & Steel Castings Co., Cleveland, discussed research reports Nos. 4 and 14, "Study of Low Ductility and Porosity of Cast Steel, Due to Hydrogen and Nitrogen." A major application of this study is that hydrogen is controlled more by what

happens in the last portion of the melting operation and in the ladle, than by the melting stock and furnace practice as a whole. Aging at room temperature is shown to reduce the hydrogen content, where high. Aging at higher temperatures accelerates the removal.

Dr. Schwartz indicated that there is reason to suspect that one of the effects of hydrogen is to interfere with the formation of cupped fractures in tensile testing even if no "fish eyes" are visible. A loss of some 6 per cent in reduction of area accompanies the occurrence of such irregular fractures. In conclusion, Dr. Schwartz pointed out that while the hydrogen research has not answered all possible questions, there is little doubt that it has given overwhelmingly more information about hydrogen in cast steel than all previous investigations combined.

E. C. Hummel, Utility Steel Foundry, Los Angeles, in a paper presented by C. W. Briggs, technical and research director of the society, considered research report No. 9, "Effect of the Methods of Deoxidation on the Impact Properties of Cast Steel." The author pointed out that a study of the data contained in this report will provide a qualified melter with a sound guide as to procedure to follow, and will prevent foundry losses due to nonuniformity.

Roy A. Gezelius, General Steel Castings Corp., Eddystone, Pa., discussed research report No. 3, "Determination of the Mechanical Properties of the Low Alloy (NE) Steels as Produced for Castings," a project undertaken primarily as an aid to the war effort. Nine of the NE steels were included in the project, a manganese steel, two grades of manganese-molybdenum steel, four grades of nickel - chromium - molybdenum steel, and two grades of manganese-nickel - chromium - molybdenum steel. The report illustrates that the range of properties obtainable with a few analyses by variations in the heat treatment is such that one analysis may be used to serve several purposes. As a result of experience gained during the war, customers are becoming more interested in the mechanical properties obtainable and hardenability required than in the use of any specific chemical analysis. This report indicates there are no fundamental differences between properties of cast steels and wrought steels of similar analysis, which makes available for use all of the published data on wrought steels.

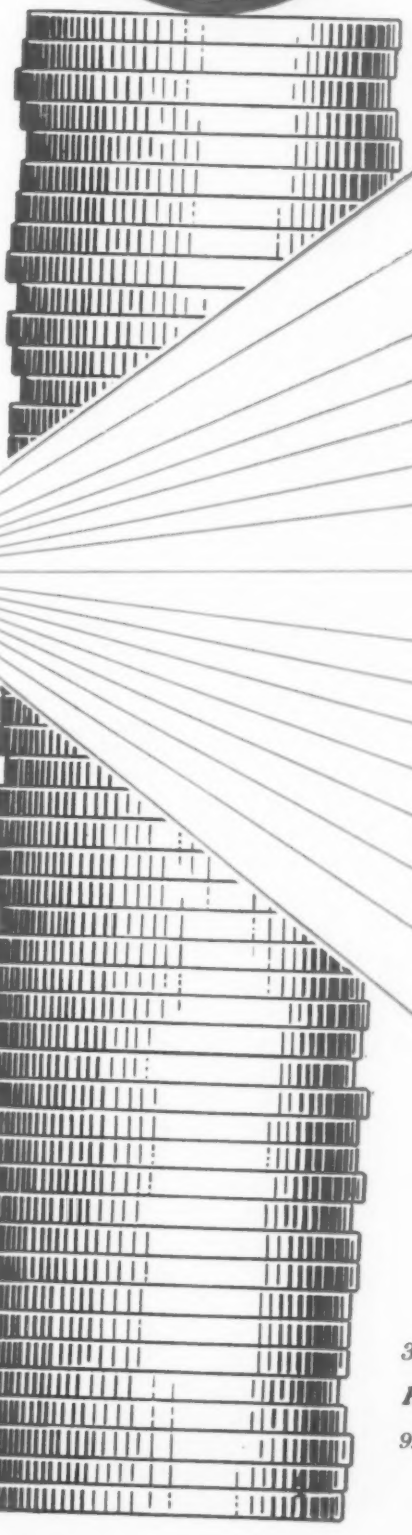
Research Data Vital

E. J. Wellauer, Falk Corp., Milwaukee, discussed the practical approach to research, in a discussion of research report No. 12 on the effect of homogenization of steel. Mr. Wellauer stated that scientific steps in analyzing, interpreting and applying research data is a vital part of good management procedures. Whether these steps are undertaken by top management in a small concern, or the director of research in a large concern, is immaterial. But definite savings can be produced in the process.

Frank X. Hohn discussed research report No. 7 dealing with a comparison of properties of core oils and binders and the development of their acceptance tests. The study included tests on 37 different dry binders and core oils from 9 different classes, making use of 11 different thermal and physical tests. It was found that there are three simple acceptance tests, any one of which will give a reliable indication of the performance of the material in production operation. Advantages gained through the use of the acceptance tests in-

(*Concluded on page* 218)

Hercules TRULINE BINDER *Cuts Core Room Losses*



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(*Concluded from page* 216)

clude improved surface appearance, increased core production, reduced core costs, accurate appraisal of sales information, and ability to maintain quality control.

J. B. Caine, Sawbrook Steel Castings Co., Cincinnati, discussed research report No. 13 "Determination of Factors Affecting Riser Efficiency." Mr. Caine showed how much the industry might save through application of the results of this research, and concluded that management has a large stake in furthering riser efficiency.

C. W. Briggs concluded the forum with a brief outline of the various research projects now in process, and stated few industries in this country have as comprehensive a program for progress advancement of their products.

The society's 1949 national safety contest held during June, July and August showed an improved safety record in that 53 foundries received awards compared with 32 awards for 1948. The following were plaque award winners in each of four groups, presentations being made at the fall meeting:

Group No. 1, 1000-25,000 man-hours, cumulative frequency rate 0—Malcolm Foundry Co. Inc., Newark, N. J.; Malleable Iron Fittings Co., Branford, Conn.; Quincy Steel Casting Co. Inc., North Quincy, Mass.; Weatherly Steel Castings Co., Weatherly, Pa.; Hunt-Spiller Mfg. Corp., South Boston, Mass.; Eastern Malleable Iron Co., Wilmington, Del.; Berkley Machine Works & Foundry Co., Buffalo; Tonawanda Electric Steel Casting Corp., North Tonawanda, N. Y.; General Railway Signal Co., Rochester, N. Y.; J. B. Beaird Co. Inc., Shreveport, La.; Hughes Tool Co., Houston, Tex.; Brewster Co. Inc., Shreveport, La.; Unitcast Corp., (plant No. 1) Toledo, O.; Forging & Casting Division, Allegheny Ludlum Steel Corp., Ferndale, Mich.; Minneapolis Electric Steel Castings Co., Minneapolis; Link-Belt Co., Chicago; Calumet Steel Castings Corp., Hammond, Ind.; Gunite Foundries Corp., Rockford, Ill.; St. Louis Steel Casting Co., St. Louis; Atlas Foundry & Machine Co., Tacoma, Wash.; National Supply Co., Torrance, Calif.; Olympic Steel Works, Seattle; Skagit Steel & Iron Works, Sedro-Woolley, Wash.; Utility Steel Foundry, Los Angeles; Pacific Steel Casting Co., Berkeley, Calif. Of this group five received the same award last year and five have won it for two successive years.

Group No. 2, 26,000-45,000 man-hours, cumulative frequency rate 0—American Steel Foundries, Newark, N. J.; Penn Steel Castings Co., Chester, Pa.; Ross-Meehan Foundries, Chattanooga, Tenn.; Mackintosh-Hemphill Co., Pittsburgh; Atlantic Foundry Co., Akron; Massillon Steel Casting Co., Massillon, O.; Key Co., E. St. Louis, Ill. Two foundries in this group have received similar awards previously.

Group No. 3, 46,000-90,000 man-hours, cumulative frequency rate 0—Bethlehem Steel Co., Bethlehem, Pa.; Continental Foundry & Machine Co., Coraopolis, Pa.; Maynard Electric Steel Casting Co., Milwaukee, Wis. One of the three foundries has been a plaque award winner twice before.

Group No. 4, 91,000 and up man-hours, cumulative frequency rate 0—Symington-Gould Corp., Depew, N. Y.; Carnegie-Illinois Steel Corp., Johnstown, Pa. Both of these companies have received plaque awards previously.

The following received certificates of achievement for cumulative frequency ratings of less than 10:

Group No. 2, 26,000 to 45,000 man-hours—Burnside Steel Foundry Co., Chicago.

Group No. 3, 46,000 to 90,000 man-hours—Adirondack Foundries & Steel Co., Watervliet, N. Y.; Bethlehem Steel Co., Steelton, Pa.; American Steel Foundries, Alliance, O.; Ohio Steel Foundry Co., Springfield, O.; American Steel Foundries, East Chicago, Ind.; Wehr Steel Co., Milwaukee.

Group No. 4, 91,000 and up man-hours—Chapman Valve Mfg. Co., Indian Orchard, Mass.; General Steel Castings Corp., Eddystone, Pa.; Pratt & Letchworth Co. Inc., Buffalo; Falk Corp., Milwaukee; Continental Foundry & Machine Co., East Chicago, Ind.; American Steel Foundries, Granite City, Ill.; General Steel Castings Corp., Granite City.

Cumulative frequency ratings for each of the past contest periods were: 1946, 33.4; 1947, 28.1; 1948, 2?.4; 1949, 19.1.

Cleaning Room Modernized

(*Continued from page* 85)

mechanism for turning the upper sections, which are larger in diameter and are placed inverted over the lower sections. Between these turntables is a square, stationary platform of the same height which also holds castings during cleaning. The turntables revolve slowly in either direction or remain stationary at the control of the operator.

Each of the turntables is driven by an electric motor through a gear reducer to a pneumatic rubber-tired wheel, which revolves in a vertical plane and presses against the underside of the turntable. Capacity of each of the turntables and the stationary platform is 25 tons, including castings, cores, adhering sand and other material. Thus the unit is capable of handling three 25-ton castings, or one 75-ton casting if all three platforms are used. The load can be made up of individual castings or of one large casting. Fairbanks, Morse cleans castings 30-ft long in the unit by laying them across all three platforms.

The hydroblast room can be divided into three sections with one of the platforms in each section, by the use of swinging steel and canvas partitions. Use of the partitions permits cleaning of castings in one or two of the sections while cleaned castings are being removed from, or dirty castings loaded into, the other section or sections.

On the closed wall of the blasting room are three elevators, on each of which is mounted a sliding carriage, which holds a swiveling water and sand ejecting nozzle.

Vertical and horizontal movement of each swiveling nozzle is accomplished by hydraulic fluid at a pressure of 500 psi. The nozzle assembly is moved horizontally on the carriage which incorporates a sprocket and rack arrangement permitting 8 ft of travel. Motivating power is furnished by a ½-hp electric motor. Electric power also is utilized to move the carriage and nozzle assembly vertically on the elevator through a chain and sprocket arrangement; vertical travel is approximately 11 ft. Fig. 3 provides a view of the three nozzles and their carriage and elevator arrangements.

The arrangement just described, coupled with the rotation in either direction of the turntables, make possible directing the sand and water stream from any angle against castings to be cleaned. Thus molding sand and cores can be washed away from almost any intricate surface contour or any pocket or cored opening in the casting.

Movement of each of the nozzle, carriage and elevator units is governed through a control panel mounted outside the blasting compartment. Vertical and horizontal movement of the nozzle carriage is controlled by the lever on the left side of the control panel shown in Fig. 5. The lever in the center controls movement of the turntable either clockwise or counterclockwise, and the right-hand lever controls the swiveling nozzle. Separate control panels govern cleaning and blasting operations for each of the three platforms. Consequently the blasting nozzles can be operated individually or simultaneously by operators at each of the three control panels.

Panels Electrically Energized

The control panels are electrically energized, and contacts made by the levers actuate solenoid switches which, in turn, operate the driving mechanisms which propel the elevator, nozzle, and nozzle carriage. The panels are interchangeable and may be moved simply by unhooking from the support member and unplugging the electrical cables.

Each of the control panels is mounted at an observation window so that the operator may watch progress of the cleaning and blasting operation. There are two control stations and four observation windows for each of the platforms which hold the castings to be cleaned. One control station with its two observation windows is located directly above the other so that control of cleaning and blasting operations for each platform may be effected from either level, depending upon where the operator has the best view of the work being cleaned.

Fig. 7 shows operators standing on catwalks at the upper and lower levels. Control of the blasting nozzles at each of the platforms can be governed from either level but not from both levels simultaneously. Should any dirty water be splashed on an observation window during the cleaning operation, it is easily washed

(*Continued on page* 220)

For the 8th Time IT'S CLEVELAND IN 1950

54th ANNUAL FOUNDRY CONVENTION AND EXHIBITION

It is definitely not too early to mark your 1950 calendar for the following dates and plan to be in Cleveland—

MAY

8...9...10...11...12

1950

It is CLEVELAND in May foundrymen say! For the eighth time in the history of the American Foundrymen's Society, Cleveland has been chosen as the scene of the Fifty-Fourth Annual Convention and Exhibit. In the great Arena and Exhibit Halls of Cleveland's magnificent Public Auditorium foundrymen from many parts of the world will gather to view the latest in foundry equipment, supplies and accessories and to attend the many valuable sessions on up-to-date casting practice.

Again the Northeastern Ohio Chapter of The American Foundrymen's Society, thoroughly experienced and seasoned in handling the many details of a convention of this size, will swing into line with the many committees and activities necessary to assure a smooth-running program.

This is just a preliminary announcement of this important event so that readers of The FOUNDRY throughout the world may make their plans to attend the convention and reserve accommodations well in advance.

THE FOUNDRY—

—Will again present two outstanding issues devoting additional editorial space to convention activities

The Pre Convention Issue for May

Will be another great issue of The FOUNDRY, previewing the convention, giving the highlights of this important week and a complete program of the show and technical sessions. This issue of The FOUNDRY will be published well in advance of the opening of the convention and all advertising messages will be seen and read before time to come to Cleveland.

The Post Convention Issue for June

Will contain in addition to all the regular features, a story of the show, what happened, who presided at the sessions and a general and interesting story on the convention itself, interpreting it in terms of benefits to all foundrymen whether they attend the show or not. This will be a great issue after a great show!

WHEREVER METALS ARE CAST YOU'LL FIND

THE FOUNDRY—

a Penton Publication

PENTON BUILDING CLEVELAND 13, OHIO

(*Continued from page* 218)
off by pulling a small chain which actuates a valve releasing a stream of clean water over the glass.

An 85 per cent water, 15 per cent sand mixture is discharged from each nozzle under pressure of 1900 psi at the rate of 75 gpm. This high pressure stream not only knocks out the cores and cleans the castings of adhering sand but does a sand blasting job at the same time. Because of the great pressure of the blasting stream, the smallest casting that can be cleaned in this installation is one weighing approximately 300 lb, and even that size casting is flipped around rather easily by the stream.

Use Special Liners

To help resist excessive nozzle wear, which might be expected under the tremendous pressure and velocity of the sand and water stream, the brass nozzles are equipped with tungsten carbide liners between the point where the sand and water are mixed and the discharge end of the nozzle. Inside diameter of the liner is approximately ⅝-in. and it becomes enlarged to such a degree during use that the liner must be replaced every 36 hr. A cross-sectional view of the nozzle is shown in Fig. 10.

Three triplex plunger type pumps powered by 100-hp electric motors furnish water at a pressure between 1800 and 2000 psi at the rate of 75 gpm to the three nozzles. These pumps are shown in the center of Fig. 8. A surge tank shown at upper left in that photo assures a constant and even supply of water to the pumps in the event of any momentary interruption of the flow of water in the supply lines. Water is piped from the pumps to the blasting room through 1½-in. steel pipe. At the blasting room, water is conveyed from these feeder pipes to the nozzles through rubber hose which permits the necessary flexibility for movement of the nozzle, nozzle carriage and elevator assembly. To reduce rusting in the water system and of the castings which are cleaned, 1 lb of potassium dichromate is added to each 1000 gal of water that passes through the pumps.

Sand used in the cleaning and blasting operation is stored in a 14-ton capacity tank and is fed in the form of a heavy slurry to the nozzles through a 1¼-in. rubber hose. Sand is not pumped from the storage tank to the nozzles but rather is drawn to the nozzles by the venturi tube action of the water rushing at great velocity past the sand inlets in the nozzles. The sand is drawn into the nozzles at the rate of approximately 120 lb per minute. No special type sand is used, as the sand removed from the castings is used as the abrasive.

During the cleaning operation, the sand from the castings being cleaned, the sand and water from the nozzle and all other materials such as core rods, arbors, gaggers, etc., drop upon a grate flooring. The sand and water pass through the grating while the rods, core arbors and other materials are caught and either reused in the foundry or discarded.

The sand and water that passes through the grating is caught by a sloping floor and conducted to a roll vibrating screen where the rolls act as lump breakers. Any tramp material that comes through the grating is caught on the screen and shaken off into an oversize skip box for disposal. A spray of water is played over the sand to facilitate washing it through the screen. The screened sand is collected in a sump and from there pumped through a 4-in. rubber hose to the 14-ton storage tank mentioned previously.

Water is pumped constantly into the storage tank to keep the sand from caking at the bottom from where it is drawn off into the nozzles for reuse. The additional water also serves as a carrier for removing surplus sand through an overflow at the top of the tank. This surplus sand and water is carried from the tank through a pipe to a dump.

Fairbanks, Morse cites the following advantages of the wet sand blasting installation at its foundry: It eliminates a lot of dust and loose dirt in the cleaning room which means better working conditions and less activity for the maintenance crew. It has reduced considerably the amount of hand work involved in cleaning castings and consequently the amount of cleaning time spent on the large size castings. Chippers can get directly to their work of removing fins without having to take time out to knock sand out of pockets in the castings.

The work of inspectors also is made easier because castings are clean as they come from the blasting unit and defects show up better. Castings with serious defects, therefore, are caught more easily before a great deal of

(*Concluded on page* 222)

Anniversary Marked by Chicago Malleable

CHICAGO Malleable Castings Co. observes its 50th anniversary this year. Founded in 1899 with plant located at West Pullman, Ill., it operated as a jobbing foundry but its principal output was agricultural malleable iron castings for the Plano Mfg. Co. When the Plano company was absorbed by the International Harvester Co. the former's interests in Chicago Malleable were acquired by the Llewellyn brothers, Edward, Silas and John.

During the second decade of its existence the company's products shifted from agricultural to automotive, general industrial and railroad use. Its contributions to materials required during World War I were diversified, but the company emerged from the war predominately in the railroad supply field. In 1918 a converter steel plant located at West Harvey, Ill., was purchased as a subsidiary company—Allied Steel Castings Co.—for the production of steel castings for railroad use. Later the converter was replaced by acid open-hearth furnaces.

JOHN T. LLEWELLYN

From 1920 to World War II numerous additions and changes were made in plant facilities and operating practices. Reverberatory furnaces gave way to a duplexing unit, and annealing and finishing equipment was modernized. Brake beam manufacturing was begun and many specialties added to the company's products. During the recent war such items as gun mounts, shell noses and range castings, in addition to castings required by industry and the railroads, were produced.

Among the original officers of the company was John T. Llewellyn, who still maintains active participation in the affairs of the company as chairman of the board. John T. Llewellyn II currently is president and Leon J. Wise is vice president.

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Dimension between beams	15 x 15	15 x 18	25 x 18½
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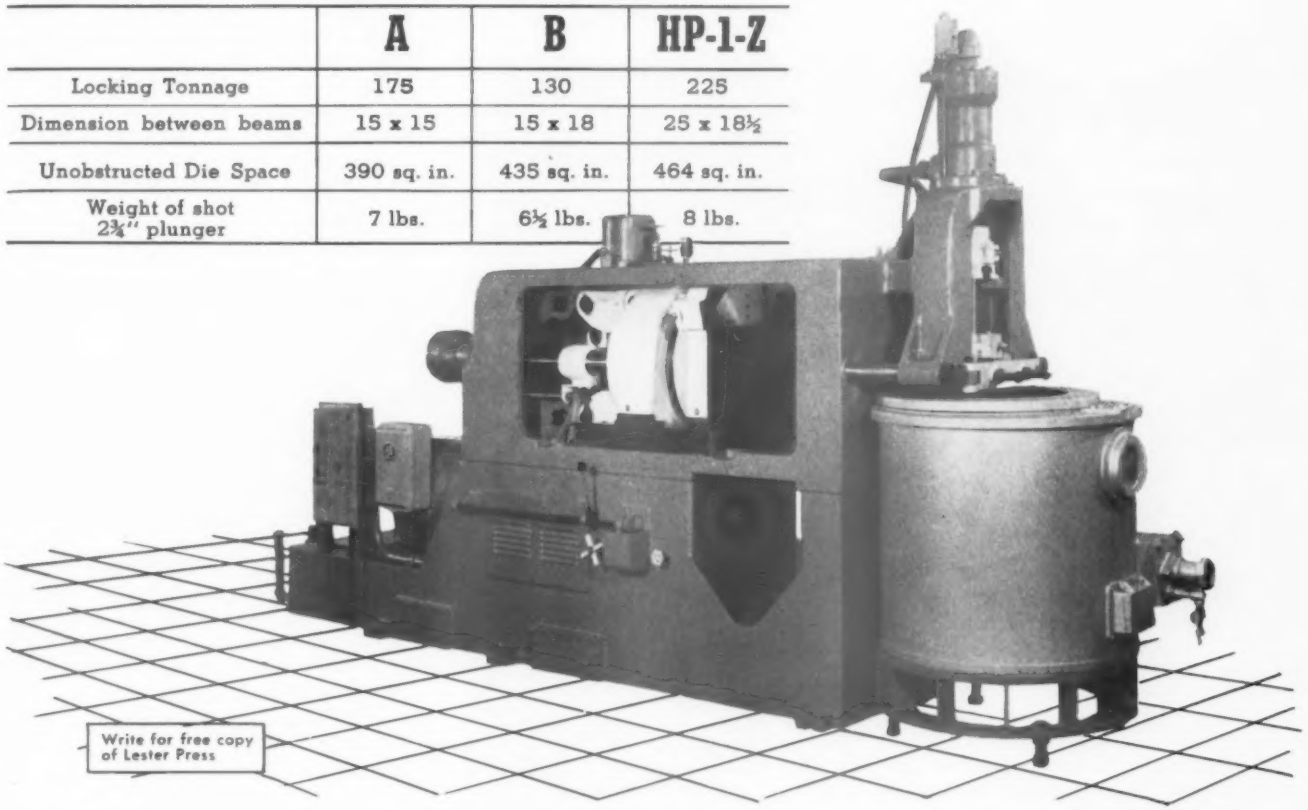
Weight of shot 2¾" plunger	7 lbs.	6½ lbs.	8 lbs.



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(*Concluded from page* 220)

costly time and effort are spent in chipping, grinding or machining operations. Furthermore, machining costs are lowered as a result of cleaner surfaces and freedom from abrasive material so injurious to cutting tool life.

Some views showing castings before, during and after cleaning are presented in Figs. 9, 12 and 13.

Name of the Marathon Foundry & Machine Co., Wausau, Wis., has been changed to Mueller-Draheim Co.

HARDENERS

(*Continued from page* 79)

liquidus curves meet at a point. That combination results in an alloy with a low melting point, generally lower than that of either of the metals in their pure state. In the case of 20 per cent iron-aluminum, these blisters, if analyzed separately from the rest of the ingot, will be found to contain 1.8 per cent iron which is the eutectic composition of iron and aluminum. This phenomenon is evident in several hardeners where the metals have limited solubility in each other in the solid state. Fig. 1 shows an ingot of 20 per cent iron-aluminum covered with eutectic blisters.

Hardeners now are in greater use due to the recent appreciation of the variety of properties aluminum alloys will exhibit and in the resulting development of special alloys conforming to rigid mechanical and chemical specifications.

Today the small jobbing foundry must be able to supply castings made from any of a score of specific alloys in order to meet competition. This often necessitates large inventories of different alloys in ingot form such as: No. 212, No. 108, No. 195, No. 355, No. 214, No. 43, and many others. This may result in an uneconomical inventory of long unused ingots.

Many Aluminum Alloys

If the foundryman attempts to alloy the elements himself, he may meet with difficulty. The principal elements which are combined with aluminum in various proportions include: Copper, silicon, iron, nickel, manganese, chromium, titanium, magnesium and zinc. With the exception of magnesium and zinc, all of these elements have melting points considerably higher than that of aluminum. The high temperatures which must be attained to get them in solution result in metal full of gas and oxides, making it unfit for casting. Because of this, double melting is necessary, resulting in large oxidation and melting losses and poor control of chemical composition.

By using hardeners it is possible to effect solution of these high melting point metals at ordinary casting temperatures so that melting losses are reduced to a minimum and only single melting is necessary. The most frequent question the foundryman now asks relative to this point is: What are the melting points of these hardeners? For one who is not familiar with cooling curves and equilibrium diagrams this is a rather difficult question to answer. Actually, only pure metals or elements and a few eutectic alloys have melting points. The majority of the metal combinations melt or freeze over a range; the temperature of beginning solidification being known as the liquidus point and the temperature of complete solidification being known as the solidus point. Depending upon the alloy, these temperatures may be 1000° F or more apart.

For practical purposes the foundryman need not concern himself with

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the liquidus temperature of hardener alloys. This is because hardeners are never remelted as such but rather are incorporated into a mixture consisting principally of aluminum. As the temperature of the furnace is raised, both aluminum and hardener will begin to melt at virtually the same temperature. By the time the metal has reached the proper pouring temperature (between 1200 and 1400° F) the hardener will be completely absorbed by the aluminum much the same as sugar is dissolved in water. It is for this reason that we prefer to think of a "solubility range" rather than a melting point or solidification range when we refer to hardeners.

Soluble at Low Temperature

For a comparison of the solubility range of some of the more common hardeners with the melting point of the pure element, refer to Table I. Note that all of these hardeners will begin to dissolve at a temperature as low as or lower than that of pure aluminum. In the maximum percentages used in aluminum alloys they will be completely dissolved at ordinary pouring temperatures. For example, the maximum percentage of silicon incorporated in commercial aluminum alloys is 13 per cent. A 13 per cent silicon-aluminum alloy has a liquidus temperature of about 1100° F so that, although the 50-50 silicon-aluminum hardener has a solubility range from 1071 to 1970° F, 26 per cent of it will dissolve in 74 per cent of aluminum at 1100° F. Easily oxidized elements such as magnesium and calcium are also usually added as hardeners.

Hence, it is evident that the difficult part of the alloying has already been accomplished by the hardener producer. Melting losses in the foundry are reduced to a minimum and accurate control of chemical analysis is possible. By carrying a small quantity of hardeners in stock with aluminum of controlled composition, the aforementioned alloys and many others can be produced. To illustrate this point, Tables II, III, IV, and V may be referred to. Table II lists the nominal composition of 20 standard casting alloys. Table III is a sample charge sheet illustrating how it is possible to prepare these alloys, using only three different hardeners and aluminum. For the foundryman who is engaged primarily in the production of No. 195 castings, Table IV illustrates how he may compound many other alloys when the occasion demands, using No. 195 as the base along with the three hardeners. Similarly Table V points out this same flexibility for the foundry generally casting No. 43 aluminum.

While the majority of the hardeners in use are binary alloys, (a combination of two metals) they are also produced as ternary alloys (a combination of three metals) or even more complex when the magnitude of the job is such as to merit the use of a special hardener to introduce all of the elements with one addition. For example, if a foundry has a contract to produce a large quantity of No. 355 aluminum castings, it could do so by using a special hardener of the following composition: Silicon 50 per cent, copper 13 per cent, magnesium 5 per cent, aluminum 32 per cent. Ten pounds of this hardener alloyed with 90 pounds of aluminum would introduce all of the required elements in one operation and would simplify the weighing of the charges so that there would be minimum chance for error.

Aside from being used for compounding alloys, the foundry using stock ingot will also find it convenient and profitable to carry a few important hardeners in stock. Such

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hardeners include 50 per cent silicon-aluminum, 50 per cent copper-aluminum, and 2½ per cent titanium-aluminum.

To understand thoroughly the intelligent use of these hardeners, a brief knowledge of the effect of copper, silicon and titanium in aluminum is essential. Copper is added to aluminum in amounts up to about 12 per cent. The strength, hardness and machinability increase progressively as the percentage of copper is increased. Above 12 per cent these alloys will become brittle and have little engineering value. Due to the decreased solubility of copper in aluminum at room temperature, these alloys are also susceptible to heat treatment. Several inherent weaknesses which tend to limit their use include hot shortness and relatively poor corrosion resistance.

Silicon is added to aluminum in amounts up to 15 per cent. Silicon-aluminum type alloys are characterized by their excellent resistance to corrosion, pressure tightness, and exceptional foundry properties which include good fluidity, low shrinkage and freedom from hot shortness. However, the machinability is poor compared with that of the aluminum-copper series of alloys.

For both copper and silicon type alloys titanium is unexcelled as a grain refiner for those castings requiring pressure tightness. Its effect is particularly noticeable in the aluminum-copper type alloys, but it will also further increase tightness in the silicon type alloys by supplementing the silicon and refining the grain. It also has a marked effect on the shrinkage characteristics of aluminum alloys and is used by many foundries to assist in producing castings with extreme variation between heavy and light section.

Now let us assume that a foundry is producing the type of castings which calls primarily for the use of No. 212 aluminum. It may be obtaining satisfactory results with this alloy until it is confronted with the problem of making several castings for ornamental purposes which require exceptional detail, or to produce an occasional casting with extreme differences between thick and thin sections where shrinkage cracks might result when using No. 212. The foundry may obtain satisfactory results by simply adding a few pounds of 50 per cent silicon-aluminum to No. 212. Three to six per cent of this hardener, in addition to decreasing shrinkage and improving castability and fluidity, will also improve pressure tightness.

Add Copper-Aluminum

Conversely, the foundry may be manufacturing castings for marine service or ornamental work from an aluminum-silicon type alloy such as No. 43 where great detail and corrosion resistance are required of parts requiring no machining. If the occasion should arise where machinability is necessary for a few castings, the addition of 4 to 6 per cent of 50 per cent copper-aluminum would accomplish this result without seriously affecting the other properties.

Foundry practice for the production of aluminum alloys using the hardener process is relatively simple, requiring no special technique. It merely consists in placing the proper amount of hardener and aluminum in the melting pot together, and raising the temperature of the melt to the usual pouring temperature. The metal is then fluxed, stirred, skimmed and poured in the usual manner.

Easily oxidized elements such as magnesium and calcium are generally added immediately prior to pouring. The hardener should be plunged into the molten metal and thoroughly stirred in. By adding these ele-

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ments in this manner there is little chance for oxidation losses and close chemical control is possible.

To obtain maximum benefits the grain refining hardeners such as titanium-aluminum and chromium-aluminum are also added just prior to pouring in the same manner. In the production of fine-grain castings to withstand pressure, special care and close temperature control are essential. If the metal is overheated or held in the molten state excessively long before pouring the castings, the grain will begin to grow again so that the effect of the refining elements will be partially lost.

To further illustrate the adaptability of hardeners, consider the foundry producing both aluminum and bronze castings. By stocking 50 per cent copper-aluminum and 50 per cent iron-aluminum, it is possible to produce many of the previously mentioned aluminum alloys, plus a wide variety of aluminum bronze alloys. An aluminum bronze containing 89 per cent copper, 10 per cent aluminum and 1 per cent iron may be prepared using the following mixture: Copper, 80 per cent; 50 per cent copper-aluminum, 18 per cent; 50 per cent iron-aluminum, 2 per cent. Or if a bronze containing 8 per cent aluminum, 4 per cent iron and 88 per cent copper is desired, the following mixture may be used: Copper, 84 per cent; 50 per cent copper-aluminum, 8 per cent; 50 per cent iron-aluminum, 8 per cent.

From these examples it is apparent that aluminum bronze of any desired composition may be prepared using these two aluminum hardeners. Low melting point of these hardeners and their high specific gravities enable them to mix readily with the copper and to produce uniform and homogeneous products.

These hardeners also are applicable for the manufacture of manganese bronze castings. Essentially, manganese bronze is a standard 60-40 copper-zinc brass containing small additions of aluminum and iron. By alloying 2 lb of 50 per cent iron-aluminum with 98 lb of 60-40 brass, a manganese bronze with a tensile strength in excess of 65,000 psi will result.

Book Review

1949 *Review of Current Research*, published by the Engineering College Research Council of the American Society for Engineering Education, Iowa City, Iowa, paper, 180 pages. Price $1.75.

Over 4000 current college and university research projects in engineering subjects are listed by title in this book. Entries from 82 educational institutions which hold membership in the Research Council describe the administrative policies for conducting engineering research and list responsible personnel, research expenditures, short courses, and conferences of special interest, and titles of all engineering research studies currently active at each institution.

Copies of the book are available from the Engineering College Research Council. Address orders to F. M. Dawson, chairman, c/o College of Engineering, State University of Iowa, Iowa City, Iowa.

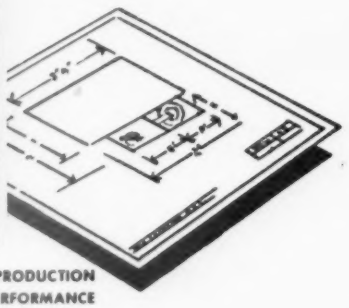
Honorable Service

Twelve employees of National Malleable & Steel Castings Co., Cleveland, received gold watches in recognition of thirty years of service with the company at a dinner sponsored by the company's service society on Oct. 15.

Those honored were: John Advent, Reis Barner, John Gergye, John Gorski, Joe Kaminski, Mike Kopan, Peter Lichko, Lawrence Neff, John Sigmeth, John Valentine, William Waight and Fred Woody.

TOP PERFORMANCE WITH AJAX TAMA-WYATT INDUCTION FURNACES for Aluminum Alloys

Ajax Induction Holding Furnace at Mid Western Die Casting Co., Chicago, Illinois



BETTER PRODUCTION THROUGH TOP PERFORMANCE IS THE AJAX RECORD

Ajax-Tama-Wyatt induction furnaces are used in the United States and abroad for melting and holding aluminum alloys in die casting, permanent mold, and sand foundries.

No flux or mechanical stirring is necessary. The metal is in constant gentle circulation assuring complete blending of alloys, and a uniform temperature throughout the metal.

Electric energy costs less than fuel and avoids danger of overheating. Completely automatic temperature controls hold metal to within 5°F., at the lowest possible temperature for perfect casting. With an Ajax the yield for perfect castings is exceptionally high.

There are no fumes and operation is practically noiseless. Shops are cooler, more comfortable—manpower efficiency is increased. Shop space is increased, for an Ajax Holding Furnace takes an average of 30 to 40 per cent less floor space than any other furnace.

The Ajax companies have been pioneers in induction melting of metals since the first World War. To date they have installed more than 400,000 KW. of furnace capacity in the United States alone. This is the background of experience behind every Ajax installation.

AJAX ENGINEERING CORPORATION
TRENTON 7, N. J

AJAX TAMA-WYATT INDUCTION MELTING FURNACE

Associate Companies: AJAX METAL COMPANY, Non Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

NEW Equipment AND SUPPLIES

For Additional Information on these Items Use Reply Card—Page 229

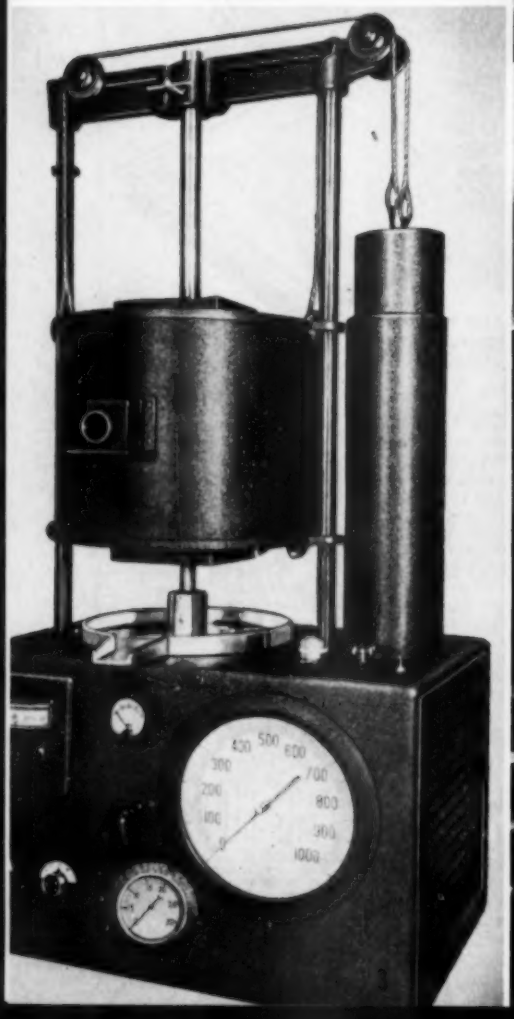
(1)—Collapsible Box: Truscon Steel Co., Pressed Steel Division, 6100 Truscon Ave., Cleveland 4 — Space saving collapsible steel box can be set up or knocked down readily, and is easily handled with platform or fork truck. The collapsible sides, when in position, are locked by pin and slide bolt arrangement. The box is manufactured in various widths, lengths and heights; height of the box must be 6 in. less than the width of the platform. The box can be tiered, loaded or empty, when set up. It can be equipped for crane or industrial truck handling.

For More Details Circle No. 1—Page 229

1

2

(2) — Testing Materials: Sperry Products Inc., Shelter Rock Rd., Danbury, Conn. — New model portable ultrasonic instrument for testing metals is modified by the use of a rectangular bezel to frame the oscilloscope screen, recessed controls and carrying handles, gray hammertone finish, and a removable bracket for holding the searching unit when not in use. The removable cover, held in place with a single catch, contains space for carrying all searching units and necessary cables. An improved pattern of square-wave "inch markers" on the horizontal axis of the screen facilitates interpretation of test results. Also, a new reject control gives the operator additional control of sensitivity by rejecting indications of small defects which do not affect the performance of the part or material under test. In operation, the unit transmits pulsed ultrasonic vibrations into the material under test. When the vibrations are intercepted by a defect or reach the other side of the material, they are reflected back to the searching unit. The resulting indications on the cath-



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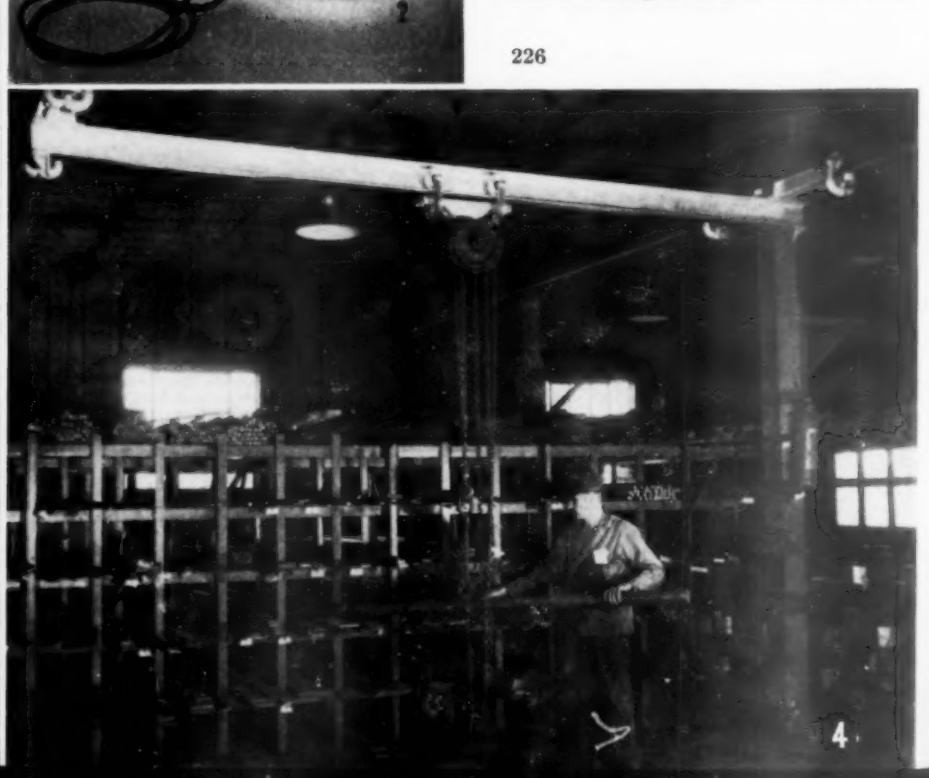


4

ode-ray tube indicate the position of the defect in the material, in relation to the surface.

For More Details Circle No. 2—Page 229

(3) — Testing Laboratory: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—High-temperature testing facilities for research and control work on molding and refractory materials is intended for use by medium size and large foundries to control the hot physical properties of molding and refractory material. Designated as model 785, the unit performs tests for hot strength, collapsibility rate under load, spalling, expansion, contraction, hot permeability, gas pressure, gas volume, retained strength under various atmospheres and different temperatures ranging from room to 2800° F. Loads of 0 to 1000 psi can be applied to specimens. A larger model, No. 753, is available for the determination of such physical properties as expansion, hot strength, retained strength, hot permeability, hot gas pressure, core collapsibility, spalling and hot deformation. Accuracy of 0.2 per cent is claimed in application of specimen loads up to 5000 lb.

For More Details Circle No. 3—Page 229

(4)—Bridge Crane: Forker Corp., 2083 Random Rd., Cleveland 6—Improved tramrail crane of floating suspension design is engineered for greater strength-to-weight ratio. Greater hook load capacity is sought through reductions of dead weight and improved wheel, track and bearing design of crane end truck and hoist trolley wheels. Maximum area and volume hook coverage has been attained by closer end approach on bridge and runway and by maximum headroom utilization. Use of swiveling crane end trucks and flexibly suspended runways is said to eliminate the possibility of binding. Crane end trucks are made of ¼-in. steel plate formed and welded. End truck and trolley wheels are high strength cast iron with deep chilled tread and flange.. A slight crown added to the wheel tread is intended to bring wear in away from the outside of the rail flange. The straight wheel flange reduces rolling friction and tends to keep the wheels straight, minimizing shimmy. Shielded, anti-friction ball bearings are used in truck and trolley wheels.

For More Details Circle No. 4—Page 229

Short-Turn Trucks: Clark Equipment Co., Industrial Truck Division, 258 Champion St., Battle Creek, Mich. — Special short-turn models of three of the company's battery-powered lift trucks are said to have a high degree of maneuverability in narrow aisles and in loading and unloading carriers. Redesign of the trucks' battery compartments and counterweights to provide angled corners has reduced the turning radii by 6½ in. on the 2000-lb truck, 6¼ in. on the 4000-lb truck and 6 in. on the 7000-lb model.

For More Details Circle No. 5—Page 229

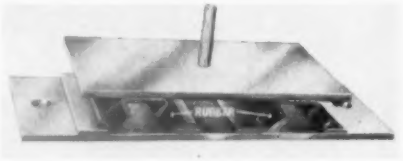
Straightening Presses: Denison Engineering Co., 1160 Dublin Rd., Columbus 16, O.—Hydraulic presses with pressure capacities from 1 to 35 tons and ram speeds up to 1300 inches per minute are offered for use in straightening malleable iron castings. Some of the advantages claimed for these presses are good control of ram movement, smooth pressure strokes that may be inched down on the work and accurate control when gage readings are used. The ram is brought down on the castings so that the ram nose tool springs the castings to beyond the straightened position and then allows the castings to spring back to proper position. Because it is often necessary to do this several times, sometimes rotating the castings by hand to remove several "high" spots, time can be saved by fast acting hydraulic presses.

For More Details Circle No. 6—Page 229

Dust Separator: Torit Mfg. Co., Walnut & Exchange St., St. Paul 2—New dust separator incorporates two cyclone separators mounted on a common bottom reservoir, which has a 20-in. wide, 28½-in. long, 15½-in. high pull-out drawer—capacity about 4½ cu ft. Equipped with a 5 hp, 3450 rpm end-mounted motor, 8-in. inlet and 10-in. exhaust outlet, it develops 2100 cfm, velocity 6000 fpm and static pressure of 3 in. Overall height of the unit is 90 in., width 35 in. and depth 29½ in. It is available only for outdoor exhaust, not for indoor recirculation.

For More Details Circle No. 7—Page 229

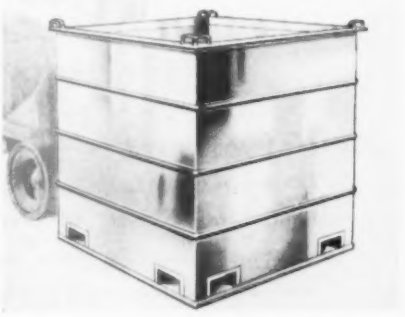
Vibration Isolator: Finn & Co., 2850 Eighth Ave., New York 30—Vibration mount is designed to isolate machinery vibration on installations where horizontal and rotary machinery vibrations are present. It consists of a specially designed steel channel floated in rubber between two steel angles. The correct angularity between the steel parts and the rubber securely bonded thereto enables the isolator to approximate the "flat" spot on a stress-strain curve of relative slope. Because the spring index (load divided by deflection) is not constant, resonance is avoided. The unit affords



uniform deflection and a load range from 600 to 10,000 lb. Overall height is 2 in.

For More Details Circle No. 8—Page 229

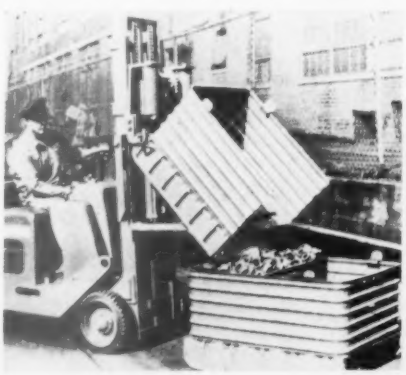
Utility Box: North American Industries Inc., 2100 North Kolmar Ave., Chicago 39 — Utility storage box is designed to take full advantage of all fork-lift tractors, conventional overhead cranes and hand-



operated pallet bed trucks. The box offers four side entry with truck lifting forks, self-positioning stacking lugs, four corner lifting hooks, construction of 12 gage hard temper steel with welded joints, and capacity of 64 cu ft. The box is 4 ft square.

For More Details Circle No. 9—Page 229

Lift Truck Accessory: Towmotor Corp., 1226 East 152 St., Cleveland—Skip box dumping device for use with fork lift trucks will handle loads up to 4000 lb. A three-sided box is fitted with metal rings at the back. Special hooks on the lift truck carriage engage these rings when the box is lifted by the forks. To dump the box, the truck operator actuates



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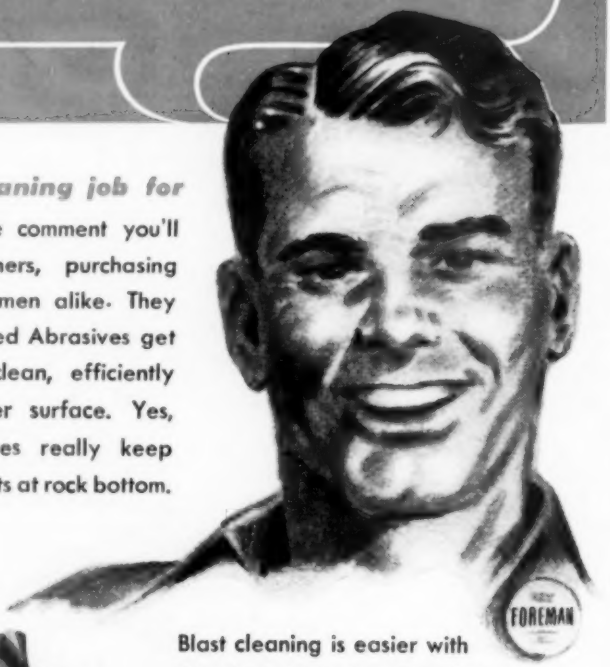
does a better cleaning job for us



A better cleaning job for us . . . that's the comment you'll hear from owners, purchasing agents and foremen alike. They all agree, Certified Abrasives get castings really clean, efficiently produce a better surface. Yes, Certified Abrasives really keep blast cleaning costs at rock bottom.

Blast cleaning is easier with Certified. Both Samson Shot and Angular Grit can be used over and over again. With them on your job you get ***more work done . . . every day.*** Order Certified today for better cleaning!

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a double-acting hydraulic cylinder which raises the hooks, tilting the box forward, allowing the load to flow out through the open front of the skip box. Two sets of vertical coil springs which have been compressed in the dumping action assist in returning the box to a horizontal position. The box is disengaged by lowering it to the floor and backing the lift truck away from it.

For More Details Circle No. 10—Page 229

Spectacle: United States Safety Service Co., 1215 McGee St., Kansas City 6, Mo.—Safety spectacle has one-piece lens made of optical safety plastic which meets government specifications for impact and piercing resistance, and can be replaced or adjusted easily. The optically correct

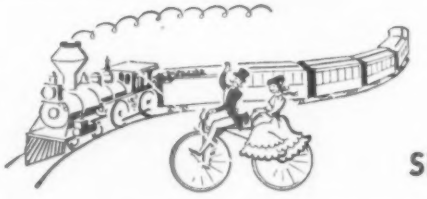
lens is available in crystal clear or antiglare green and has an integral molded sweat bar designed to provide unusual rigidity. Detachable temples may be attached to the outside edge of the lens, making it possible for the wearer to adjust the temples for proper fit and comfort. Spectacles can be adjusted to wear over personal glasses.

For More Details Circle No. 11—Page 229

Speed Control: Reeves Pulley Co., 1225 Seventh St., Columbus, Ind.—Variable speed control unit is designed to provide accurate and dependable variable speed control for small and light machinery without stopping the machine. Unit comprises a self-adjusting V-type pulley which may be mounted on the shaft of the constant speed motor, and connected with V-belt to driven machine. As the motor is moved back on a sliding or pivoting base, the V-belt rides on a smaller diameter in the expanding pulley, and the speed delivered to the machine is decreased. As the motor is moved forward, the

(*Continued on page* 232)

80th Birthday of the oldest name in chain



Since 1869 . . . Security in every link

IN 1869 the driving of a golden spike united the Union Pacific and Central Pacific Railroads . . . joined our eastern and western coasts.

In the same year Thomas Edison announced the opening of his electrical laboratory. The Indian Wars officially ended. Popular songs were "The Little Brown Jug," "Shoo Fly, Don't Bother Me," and "Up in a Balloon."

And — in 1869 David Round founded the chain-making organization which today operates factories in six U. S. cities . . . whose products are used in homes and industry throughout the world.

David Round learned his trade as an apprentice in his father's hand forged chain plant in Staffordshire, England. A master chain craftsman, he demanded the utmost in fine workmanship . . . refused to compromise with quality.

This insistence upon perfection continues today.

It is the guiding spirit of the organization which is now headed by Raymond L. Round (chairman of the board and president), a grandson of the founder.

Members of the supervisory group in the Cleveland factory (foremen and superintendents) average 26 years of service. Six have exceeded 40 years. Many families claim three generations in Round plants.

And, working side by side with veteran craftsmen, are large groups of carefully selected younger men. They are being trained to maintain the Round standards of quality...will provide business leadership in years to come.

To the Round organization, the production of fine chain is more than a business. It is a tradition to be upheld . . . a reputation to be carefully guarded. And, above all, it is a clearly recognized responsibility which guarantees that every Round Chain product will be unsurpassed in quality.

CLEVELAND CHAIN

The Cleveland Chain & Mfg. Co.
Cleveland 5, Ohio

Industrial Sling Chains • Farm Chains • Marine Chains • Tire Chains • Log Chains • Building Chains • Railroad Chains • Crane and Dredge Chains • Sugar Cane Sling Chains (with Grip Trip)

Round Associate Chain Companies: **The Bridgeport Chain & Mfg. Co.**, Bridgeport, Conn. • **David Round & Son**, Cleveland, Ohio • **Round California Chain Co.**, So. San Francisco and Los Angeles, Cal. • **Seattle Chain & Mfg. Co.**, Seattle, Wash. • **Woodhouse Chain Works**, Trenton, N. J.

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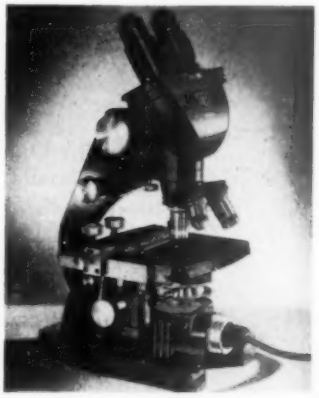
BENTONITE SALES OFFICE:
RAILWAY EXCHANGE BLDG.
CHICAGO 4 • ILLINOIS

(*Continued from page* 228)

pulley contracts under spring tension causing the belt to ride at a greater diameter, and speed is increased. Unit is made in six sizes for use with any standard constant speed motor up to 1½ hp and delivers infinitely variable speed to the driven machine between the range of 1¾ to 2¾:1.

For More Details Circle No. 12—Page 229

Microscopes: American Optical Co., Scientific Instrument Division, Box A-504, Buffalo 15—New series of microscopes incorporate a number of features and refinements, including an aluminum stand which reduces weight by one-third over previous models but provides increased strength and rigidity. Other features claimed are an inclination joint that



showed no measurable wear after 2 million recriprocating motions on a test model. Fork-type substage has new locking and keying devices which are said to provide quick, positive positioning of the condenser for correct optical alignment no matter how often it is moved. New tension adjustment is designed to set coarse focusing and substage controls for as easy or as stiff operation as desired. Ball bearing ways reduce friction in the fine adjustment and spring loading eliminates backlash and reduces possibility of breaking the cover glass. New "pinch grip" mechanical stage permits rapid insertion of slides without danger of disturbing mechanical adjustments. The nosepiece accurately centers objectives by a ball and groove stop. It has dual cone construction that doubles bearing surface, lengthens its life, and assures correct alignment and parfocality of objectives.

For More Details Circle No. 13—Page 229

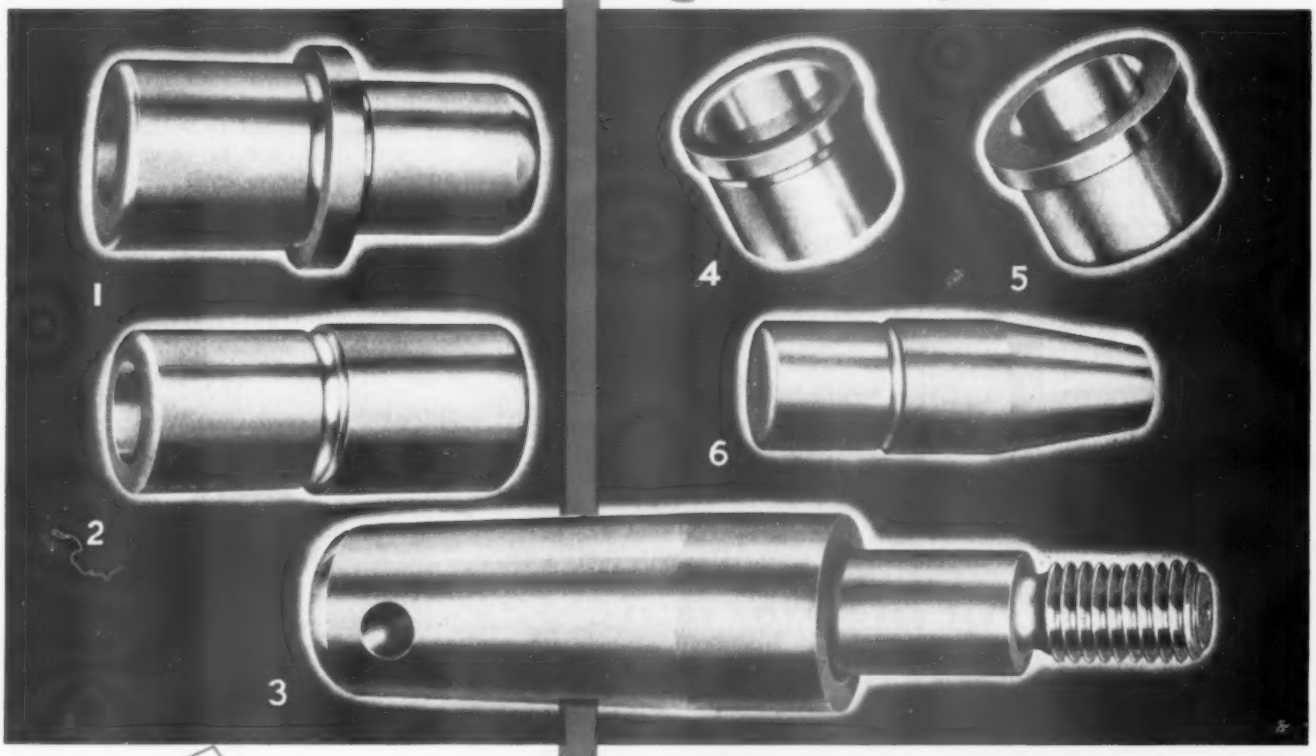
Grinders: Standard Electrical Tool Co., 2507 River Rd., Cincinnati 4—The company's 10, 12 and 14-in. double end grinders are equipped

(*Continued on page* 234)

For accurate line-up of cope+drag

UNIVERSAL FLASK PINS AND BUSHINGS

Many of the cope and drag problems encountered in all foundries *are effectively solved* with the use of Universal Flask Pins and Bushings. Whether cast iron, aluminum or steel flasks are used, these modern foundry accessories *insure positive alignment, make possible new production speed.* Hardened and ground for longer life, they are available from stock in various standard sizes and shapes. Special sizes made to order. Write for complete catalog.



1. Shoulder Flask Pin
2. Plain Flask Pin
3. Plate Pin
4. Round Flask Bushing
5. Elongated Flask Bushing
6. Double Match Plate Pin

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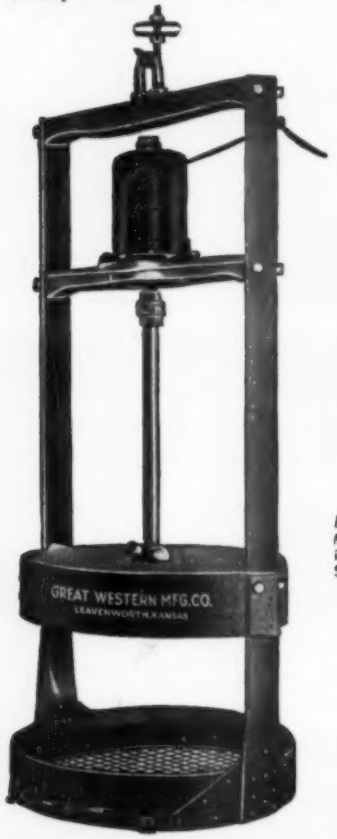

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Money Saving, time saving, sand saving. Only $280 f.o.b.

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Automatic Discharge of gaggers, refuse, etc. 24" screen completely equipped. $290 f.o.b.

At an operating cost of only ½ to 1 cent per hour, Combs Gyratory Foundry Riddles do the work of 20 men riddling by hand—and do a better job.

Quick Removable steel-rim sieves . . . completely enclosed 1/3 horsepower motor . . . dust-proof ball bearings . . . sturdy, simple construction . . . Prompt delivery from your Foundry Supply House.

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GREAT WESTERN MANUFACTURING CO.
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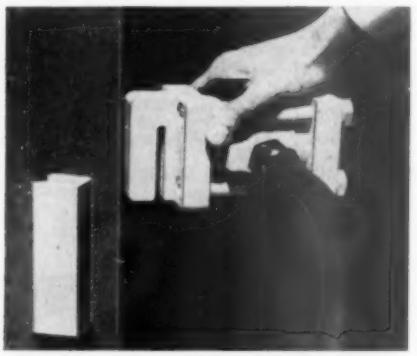
(*Continued from page* 232)

with three spindle speeds to maintain 6500 sfm on vitrified bond wheels and 9500 sfm on resinoid bond wheels. As the wheel reduces in diameter the interlocking arrangement permits the change in speed to return the worn wheel to its original efficiency. This permits obtaining the maximum efficient usable wheel life as small as 5½ in. in diam.

For More Details Circle No. 14—Page 229

Vibrator: Cleveland Vibrator Co., 2788 Clinton Ave., Cleveland 13—Pneumatic vibrator can be attached to and removed from units that require vibration, such as hoppers, bins, screens, foundry flasks, and for fatigue testing and other applications where vibrator installation cannot be permanent. The vibrating mechan-



ism is designed to withstand continuous use, and is equipped with a rugged milled steel hook. Female brackets, designed to receive and hold the vibrator hook, are obtainable for welding or bolting to the item to be vibrated. Unit is obtainable in a 2-in. diam piston size and operates on 50 to 100 psi air pressure, the amount of pressure determining the number of vibrations per minute. At 80 psi line pressure, the unit develops approximately 1200 blows per minute consuming approximately 10 cfm of air for continuous operation

For More Details Circle No. 15—Page 229

Arc Welder: Air Reduction Sales Co., 60 East 42nd St., New York 17—Heavy duty arc welder is built in 300 and 400 amp sizes. The welder is a direct current, 40-v, NEMA-approved, variable voltage generator. It features simplified control of current output. For instant recovery voltage over short circuit, the generator is self-excited with excitation of the main field obtained through an auxiliary brush. The unit is powered by a six-cylinder industrial engine through sheaves and steel cored V-belts, and is available

(*Continued on page* 236)

MILLIONS DREAM OF COMING TO THE U.S.A.

maybe they know something you don't

These newcomers to America know some things better than we do.

They have worked in jobs picked by a dictator's order. They know what freedom can mean . . . the right to work where you please, and advance by your skill.

They have had their fill of police states. They know the value of freedom . . . the right to a voice in elections, free of fear.

They have seen hunger and shortages enough to make America's darkest days seem like times of plenty. They know our system of free competition, free collective bargaining, private property, personal incentive, has brought a standard of living unequalled in the history of the world.

Let's keep America that way . . . the hope of the world.

Let's make sure that our freedom is not stolen. And let's keep right on raising our standard of living . . . making sure that there will be still more for every American to have and enjoy in the future.

We can do it, too. We've learned from the past that in good times or bad the way to have more is to produce more for every hour we work. So let's keep on working together—labor and management—to increase productivity . . . devising new ways to use mechanical power to free human beings from burdensome toil . . . building new and better machinery that cuts time and cost . . . sharing the benefits of better production.

Then it will be possible for all Americans to keep on producing more and more goods . . . working shorter hours . . . and enjoying an ever higher standard of living.

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Spencer Foundry Turbo

SPENCER FOUNDRY PROTECTION

for Men, Melts and the Pours

Spencer Turbos are the accepted standard for foundry cupolas because they provide maximum reliability of the air supply over long continuous service. Constant volume or weight of air can be maintained by hand or automatic control whichever is preferred.

High dust counts and shut-downs must be kept to a minimum in the modern foundry.

Spencer Vacuum Cleaners, stationary or portable, remove overhead dirt, clean patterns, molds and castings, and reclaim foundry sand. It helps keep the dust count down.

Both machines are of the centrifugal type with wide clearances, light weight impellers, low peripheral speeds, and only two bearings.

The result, a quiet running machine which requires no special foundations. For reliability, we can refer you to Spencers that have been in service 25 to 40 years.

ASK FOR THESE SPENCER BULLETINS

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No. 116	Piping and Valves
No. 137	Boiler Cleaning
No. 102	Portable Vacuum Cleaners
No. 125	Central Vacuum Cleaners
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No. 142	Turbo-Agitation
No. 127	Turbo-Compressors
No. 109	Gas Boosters
No. 112	Foundry Blowers

Cleaning molds with Spencer Vacuum

332-D

SPENCER HARTFORD

THE SPENCER TURBINE CO.
HARTFORD 6, CONN.

(*Continued from page* 234)

in stationary or portable models. It is 76 in. long, 28 in. wide and 49 in. high.

For More Details Circle No. 16—Page 229

Battery Filler: Electric Storage Battery Co., Nineteenth St. & Allegheny Ave., Philadelphia 32—Battery cell filler consists of a tube with molded rubber nozzle at one end and,

at the other, a handle which is equipped with a valve operated by finger control. At the valve or handle end is an electric signal lamp which flashes a warning when the water in the cell reaches the correct level. The lamp is operated from five dry cells carried in a small steel case attached to a canvas belt, which goes around a maintenance man's waist; or from a 115/6 volt transformer.

For More Details Circle No. 17—Page 229

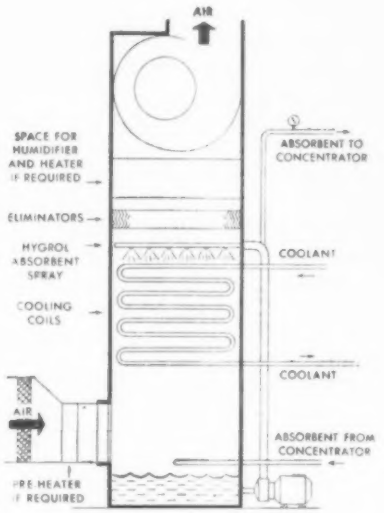
Drop-Bottom Bin: Yale & Towne Mfg. Co., Philadelphia Division, 4530 Tacony St., Philadelphia 24—Drop-bottom skid bin has a large eye welded to the end to which the bottom is hinged. To engage the eye,

a hook is secured to the top of the mast of the lift truck which handles the bin. Forks lift the skid-bin to where the chain manipulated hook engages the bin eye and suspends the bin. The operator then lowers the forks of the truck, allowing the bottom of the bin to hinge downward

and release the load. After being disengaged from the hook, the bin can be placed on the floor or tiered for future use.

For More Details Circle No. 18—Page 229

Air Conditioning: Niagara Blower Co., 405 Lexington Ave., New York 17 — Air conditioning system provides complete control of temperature and relative humidity, holding constant conditions or varying them at the will of the user. Air drawn into the system is filtered and then enters a chamber where it is dehumidified and cooled. The air stream then passes through entrained moisture eliminators and is diffused in the space to be conditioned. The same equipment may be used to provide winter air conditioning when required, by installing a tempering coil at the outdoor intake, a humidifier, and a reheat coil above the eliminators. The equipment is manufactured in a range of sizes providing from 1000 to 20,000 cfm of conditioned air from a single unit. Multiple unit installations are practical.



NIAGARA CONTROLLED HUMIDITY METHOD — FLOW DIAGRAM

For More Details Circle No. 19—Page 229

Magnetic Separator: Dings Magnetic Separator Co., 4708 West Electric Ave., Milwaukee 14—New permanent magnet drum type magnetic separator is furnished with shaft and V-belt drive sheave, for automatic tramp iron removal, and is designed to be installed at the discharge end of chutes, spouts and conveyors which handle nonmagnetic materials. Features include circumferential pole design for uniformity of magnetic field across the drum width, adjustable dual-purpose leveler and burden feed control. The nonmagnetic manganese alloy steel

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drum shell revolves on sealed, self-aligning ball bearings while the permanent magnet inside the drum shell remains stationary. Nonmagnetic material flows over the drum shell in a normal trajectory, the tramp iron holding fast to the drum by the magnetic pull, dropping off when it passes out of the magnetic field.

For More Details Circle No. 20—Page 229

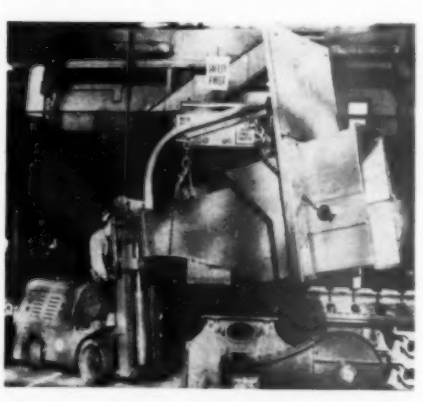
Welding Alloy: Eutectic Welding Alloys Corp., 40 Worth St., New York 18—Thirty-six feet of ⅛ in. diam welding alloy for zinc die castings and a jar of die casting flux is offered in a package. Materials are intended for shop use, for build-ups, repairing zinc die castings and joining die castings to aluminum, steel, brass or bronze. The welding alloy is designed to weld without fusion or puddling of base metal. Used with the flux, greater fluidity is achieved; without the flux, build-ups and overlays are possible. It is designed for use with oxyacetylene, oxyhydrogen and other similar gas torches, and bonds at 600° F with excellent color match to zinc die casts are claimed.

For More Details Circle No. 21—Page 229

Car Shakeout: Robins Conveyors Division, Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.—Car shakeout is designed to unload up to 15 hopper bottom cars containing granular material in an average day. The unit, which is placed in position on the top of a car by hoist or crane, measures 11 ft in overall length, 5 ft, 7⅛-in. wide and 3 ft 5¾-in high. Unit weighs 6900 lb and is powered by a 10-hp electric motor.

For More Details Circle No. 22—Page 229

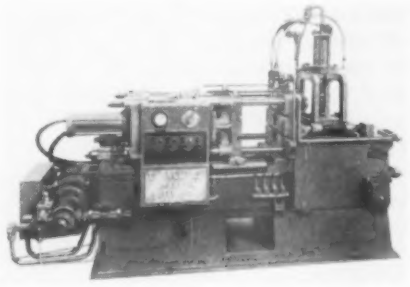
Lifting Boom: Buda Co., 154th St., & Commercial Ave., Dept. LB, Harvey, Ill.—Lifting boom for handling bulky material has been added to the line of accessories available for the company's 5000-lb capacity at 20 in. load center truck. Boom is interchangeable with the forks and



attached to the carriage in the same manner. Swivel hooks can be positioned in any of six positions on the boom for carrying bulky and odd-shaped loads.

For More Details Circle No. 23—Page 229

Diecasting Machine: Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12—New model diecasting machine is a high-pres-



sure hydraulic machine equipped with a two-stage pump driven by a 10-hp direct connected motor. The pump delivers 43 gpm at the low pressure stage and 1½ gpm at the high pressure or 500 psi stage. Machine can be furnished as a cold chamber machine for casting aluminum or as a gooseneck type of machine for casting zinc, tin, or lead. Either automatic or manual controls can be supplied. Die plates are 18 x 22 in. and the four tie bars are 2 in. in diam. Space between tie bars is 12 x 16 and the die opening is 8 in. An estimated 50 tons locking pressure is obtained. The machine can produce aluminum castings up to 2½ lb and zinc castings up to 4 lb. The free cycle time of the machine is over 1000 shots per hour, it is claimed.

For More Details Circle No. 24—Page 229

Hardness Testing: Clark Instrument Co., 10200 Ford Rd., Dearborn, Mich.—Steel ball penetrators are designed for accurate hardness testing in all makes of Rockwell testing machines. They are made of hardened steel ground to a precise roundness, providing smooth, even penetration that is said to assure unusually accurate readings. They are available in 1/16, ⅛, ¼ and ½-in sizes, and are used with Rockwell scales B, E, F, G, H, K, L, M, P, R, S, V, 15-T, 30-T, and 45-T.

For More Details Circle No. 25—Page 229

Aluminum Paint: Speco Inc., 7308 Associate Ave., Cleveland—Heavy duty aluminum antirust paint utilizes a recently developed aluminum paste which is said to "leaf" on all surfaces and not turn brown under the most adverse weather conditions.

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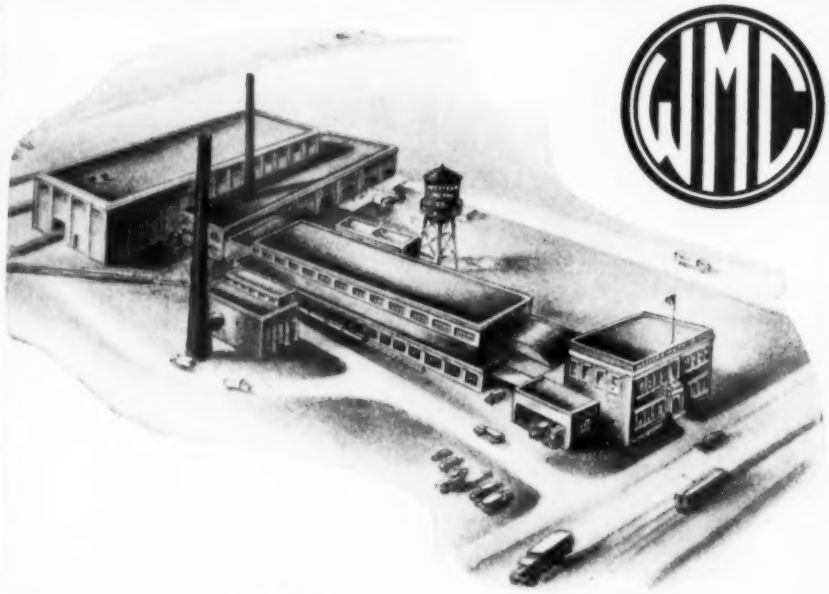

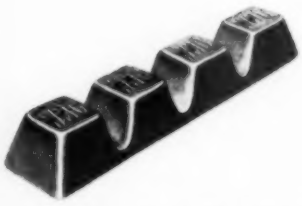

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Further claims are that it can be applied right over rust without wire brushing or scraping and that it penetrates and seals the surface, preventing further rust action. It is suitable for both interior and exterior use and is furnished in proper consistency for either brush or spray application.

For More Details Circle No. 26—Page 229

Truck: Barrett-Cravens Co., 4609 South Western Blvd., Chicago 9—Hydraulic lift truck is designed for one-man handling of skid and pallet loads up to 6000 lb. Maximum lift is 4 in., and the higher the load is lifted, the greater the clearence under the truck. Telescopic lift handle is adjustable in length, permitting

use of the truck in narrow quarters. A spring hold-up keeps the handle off the floor and out of the way when the truck is not in use. The truck is built in 20 and 25-in. widths with platform lengths from 36 to 72 in. It also is available in a twin-forked model for handling pallets.

For More Details Circle No. 27—Page 229

Core Binder: Plastics Dept., American Cyanamid Co., 30 Rockefeller Plaza, New York 20—Liquid, synthetic resin binder for sand cores and dry molds can be pumped and/or metered and is otherwise adaptable to existing equipment and methods common to many foundries. It contains no additives, such as cereal, fly ash, silica, flour, and others. It is said to produce water-resistant cores which withstand high humidity and long lay-overs in the mold and it can be cured in either conventional or electronically heated ovens.

For More Details Circle No. 28—Page 229

Ice Remover: Chem Industrial Co., 1114 Hippodrome Bldg., Cleveland 14—New chemical reputed to melt snow and thaw ice is produced in the form of minute pellets. The material is claimed to be 99 per cent active, and to leave no residue. It is applied by sprinkling liberally over ice or snow surfaces and, if used at the start of a snow or sleet storm, is said to melt subsequent sleet or snow falls.

For More Details Circle No. 29—Page 229

Investment Casting

(*Continued from page* 93)

and lodge at the bottom or along flat surfaces of the mold. When metal enters the mold it surrounds those particles and results in pits.

Rough surface was encountered on some castings. It was believed either due to silica being fused by the hot metal, or to some reaction between the metallic oxide binder and the metal. Several molds were made of the metallic oxide binder without any silica. The resultant castings showed very bad surface. Examination under the microscope showed that the metal had penetrated into the ceramic and a definite reaction had taken place between the metal and the cement. This indicated the need for a precoat if this ceramic was used.

Effort was made to find a substitute investment that would not require a precoat. As a base, 200 mesh silica was chosen, to which was added sodium silicate binder from 18 per cent down. All of the mixtures cracked severely during air dry although the degree of cracking decreased as the amount of silicate decreased. This cracking is due to the high shrinkage of the silicate in drying. The result of the cracking was heavy fins on the castings.

Try Many Mixtures

The next trial made use of magnesium oxychloride cement. This was made by mixing equal parts of magnesium oxide and magnesium chloride. This was used with both 200-mesh silica and 200-mesh alumina as base materials, adding 20 per cent of the cement to 80 per cent of the base material. This cement was found to give good bond up to about 800° F. Above this temperature the molds cracked severely. Good surface finish was obtained with silica as coarse as 90 mesh. To improve hot strength of this cement calcium phosphate was added as hot bond. Cracking above 800° F decreased somewhat. The mixtures were not very fluid and required heavy vacuuming. Borax was also tried as hot bond, but the investment was so hard it could not be removed from the flask.

Colloidal silica was also tried as cement. It was used as a water solution containing 18 per cent silica. It was used with both 200 mesh silica and 200 mesh alumina as base materials, with 0.5 per cent magnesium oxide as starter for the reaction. Colloidal silica was varied from 33

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to 3 per cent by weight. Shrinkage and cracking of the mold was severe. The shrinkage during dryout was so great that some of the flasks could be stripped from the investment after drying. There were mold cracks which resulted in fins. The tendency to shrinkage and cracking decreased as the silica content decreased; however, even with only 3 per cent silica some shrinkage and cracking persisted. The material was hard and difficult to remove from the flask even with only 3 per cent colloidal silica.

Substitution of coarser silica reduced the overall shrinkage and gave better results than any of the other mixes. However, some plants are said to be successfully using colloidal silica by making a thick mixture of silica sand and colloidal silica and vibrating for long periods of time (one hour). This vibrating seems to pack the cemented silica grains closer together and the excess colloidal silica floats to the top where it can be cut off or otherwise removed before burnout.

It thus appears that the development of a one-coat ceramic for high temperature applications is no easy problem. The best deduction seems to be that some high temperature clay, such as kaolin or similar material which can be vitrified before casting, offers the best solution. But, again, cost must be balanced against results.

Preparing the Mold—After the investment is in the flask, a three-stage operation is necessary to prepare the mold for pouring: 1. Drying out moisture. 2. Eliminating patterns. 3. Burnout, or baking of ceramic.

Where wax patterns are used, steps 1 and 2 coincide. However, when polystyrene patterns are used, the first step only drives off excess moisture. Plastic patterns burn out or eliminate at a temperature between that used for drying and that used for baking the ceramic. All molds are placed in drying oven bottom side up so that the pattern material can drain out as it melts. Also, the wax holding the flask onto the base melts and the base can be removed and used again.

With wax patterns a dryout temperature of 200-220° F for several days effectively dried the mold and eliminated the bulk of the pattern wax. When polystyrene patterns were used it was found that this drying temperature had a great effect on the cracking of the molds. Castings made with plastic patterns developed fins due to cracked ceramic. It appeared to be connected with the ex-

pansion of the patterns during the time the ceramic had not attained strength. It has previously been mentioned that polystyrene has a critical point at about 180° F where the plastic expands rapidly. At this time the ceramic is weak and the expansion of the patterns causes cracks to open up. By reducing the dryout temperature to 140-150° F, the tendency for these expansion cracks was greatly lessened.

When wax patterns were used it was customary to load the burnout oven and increase the temperature 100° F per hour until 1200° F was reached. The molds were then held at 1200° F for 12 hours to thoroughly eliminate any wax or carbon residue. This length of time was found to be necessary if minute surface pits due to reaction of residue with metal were to be avoided. The long period was made necessary by the fact that the wax soaked ½-inch or more into the investment during the dryout and had to be drawn out by the use of extensive heat, due to the low permeability of the ceramic. This made an overall burnout cycle of 24 hours.

Produced Rough Surfaces

When the wax dryout and burnout techniques were used for plastic patterns, rough casting surface often appeared in small areas of castings. The appearance was visible as a dull finish compared with the shiny, smooth finish of the normal casting. This defect was never deep but gave bad appearance. The condition appeared only when plastic patterns were used, and it disappeared when elimination temperature was lowered to 140-150° F and burnout cycle was speeded up. Instead of the usual 100° F per hour the rate of heating was increased to 160° F per hour. This decreased the heating cycle from 12 to 7½ hours, a reduction of 37.5 per cent.

It is believed that the condition resulted from the heavy viscosity of the plastic. Wax, when it melts, runs freely and flows from the mold like water, but plastic never becomes a true liquid. It goes through a syrupy stage and flows only slowly. It appeared that this syrupy liquid actually would lie in certain areas of the mold and infiltrate slightly into the investment. Then as temperature rose still more and the material flowed out, it took very small particles of investment with it. By increasing the heat input the plastic apparently did not have time to lie long enough in the syrupy state to soak into the investment. So far as experiments went, the more rapidly the plastic was removed, the better

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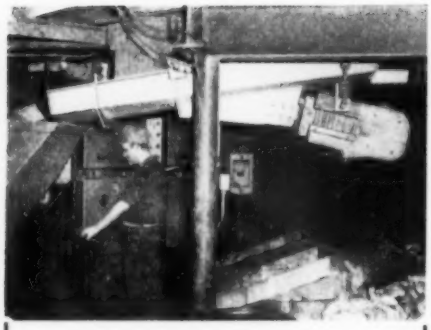

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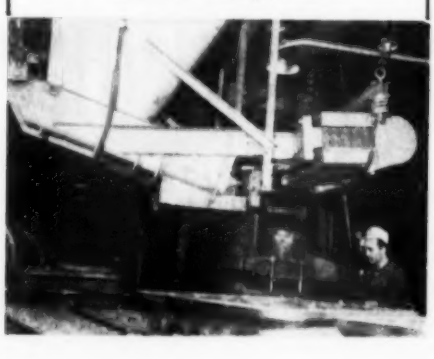

the finish of the castings' surfaces.

It was further found that for low-temperature investments, soaking time at 1200° F could be reduced from 12 hours to 2 hours when plastic patterns were used. This is a reduction of 10 hours or 83 per cent in soaking time, and a reduction of 14½ hours or 60 per cent in overall burnout cycle. The saving in soaking time results from the fact that, due to its greater surface tension, plastic does not soak into the investment to any great extent. It was not practical to reduce soaking time below two hours since if all carbon residue is not removed it will produce areas having a rough casting surface.

Where gypsum is used in the investment the burnout temperature should not exceed 1200° F or the calcium sulphate will break down. Temperature must be at least 1000° F to effectively remove carbon.

Delay Rise In Temperature

High temperature investments are commonly fired for five to six hours at 1600-1800° F after heating gradually to this temperature. In any event, the rise in temperature must be delayed at about 1100° F, inversion point of silica, otherwise mold cracking can be expected from the rapid expansion at this temperature. Where it is desired to vitrify the ceramic, higher temperatures are, of course, needed. If moisture is not removed and the mold is fired too hard, the formation of steam in the ceramic may crack it or cause a spalling on the interior faces of the cavity.

All of this indicates the necessity for good temperature control on all furnaces, including controls which will allow rapid and constant increase in temperature as well as uniform holding temperature. Arrangement must also be made to introduce sufficient oxygen into the furnace to burn the large volume of plastic readily. If combustion of the plastic is not fast enough, very heavy deposits of carbon will form that are difficult to burn out and will materially affect overall burnout cycle.

When wax patterns were used pits resulted on castings as a result of small parts of investment dropping into the mold prior to or during casting. These were severe enough to cause high rejection rates. Careful burnout and handling did not seem to correct more than a minor part of this trouble. However, this type of defect decreased considerably when plastic patterns were used. It is believed that the principal cause of this condition was the fact that when the wax melted it soaked into the investment during the drying cycle. When the molds were fired

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the wax tried to force its way out of the investment, and quite often the evolution was violent enough to lift small flakes of investment to form a scabbing condition. When metal was poured into the flask, it either broke loose those films of investment or flowed around them, in either case resulting in pits.

In the case of ferrous and other high melting point alloys, the molds are usually pulled right out of the burnout furnace and poured as quickly as possible to avoid heat loss. However, with nonferrous lower melting point alloys it has been found that to obtain best results the molds must be cooled before pouring. Different alloys require different mold temperatures, so the range of mold temperature may be from 1000° F to room temperature. To save time, to give more flexible operation, and increase output, it is much better to use small batch type furnaces for low temperature work than to use one big continuous burnout furnace. The cooling rate will be faster, and the molds requiring low pouring temperatures can be segregated from those requiring higher pouring temperatures, so that it is not necessary to wait for a large furnace to cool through the respective ranges before finally casting the molds requiring low pouring temperature.

Gating Practice—Set-up of patterns is their joining or assembly into a unit which will be invested and cast. It is evident that if set-up is to be economic and efficient, much forethought must go into the original design of the dies or molds. The first object is to get into the mold as many pieces as can be cast at one time with satisfactory quality. The second consideration is how this can be done rapidly in production. If the number of parts required is small, or if the patterns are to be made singly of wax, then less advance thought is concerned since the parts can be set up by hand in almost any conceivable manner.

However, if the patterns are to be made in groups, or if injection dies are to be made for large production runs, then planning must start with mold and die design. This is so because if assemblies are to fit together right, the patterns must be produced in size and shape readily adaptable to rapid assembly. Wherever possible on injection made patterns, the gates and runners which admit plastic to the die cavities should be of such design that they may also be used to introduce metal into the mold cavities after the patterns have been eliminated. If these are properly designed, then for assembly it is only necessary to remove

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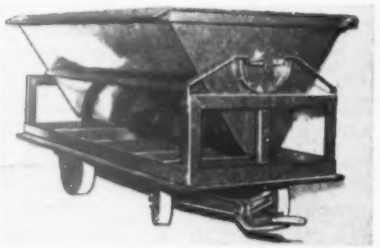

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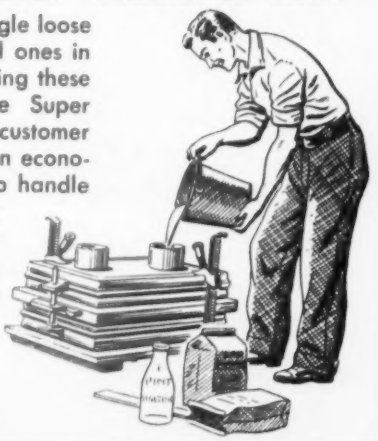

TAMMS INDUSTRIES, INC.
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the sprue from the pattern and assemble the patterns complete with gates and runners. Then the pouring sprue necessary for the entire assembly is attached. For this purpose wax or polystyrene bars, flats or other standard shapes can be used.

Small pits can result if patterns are designed so that they do not join solidly when placed together and tiny spaces are left. Unless those spaces are filled with plastic or wax during set-up, the investment will flow into the cracks and result in fins of investment which will wash into the mold.

In arranging set-up the following factors should be considered: Ease of assembly and cementing, drainage from the ceramic mold, flow of metal into the cavity, and cutoff operation. Either round or rectangular flasks may be used. At least ½-inch should be allowed for ceramic wall between patterns and flask wall, and at least ¾-inch, preferably 1 inch, from bottom of setup to bottom of flask. These thicknesses are necessary to insure sufficient strength for the ceramic to withstand expansion of plastic, thermal shock and pressure used in casting the metal. Actual arrangement of patterns should be such that the minimum of straight lines or planes of weakness will be formed in the ceramic. Usually ⅛ to ¼ inch should be allowed between patterns or rows of patterns.

Staggered set-ups help prevent cracks when using plastic patterns. That is, if the first row has heavy shoulder of the set-up on the outside, then the next row should be reversed so that a thin plastic dimension is on the outside. Where this is impossible or impractical, then the rows should be offset by having every alternate row indented so that no two adjoining rows have a heavy section at the same level. It appears that stresses created during expansion cause cracks which will tend to be continuous across the mold unless lines of stresses are broken up. The staggering of set-ups will break up these stress lines.

Sometimes cracking occurs around areas which have large sections of plastic, such as sprues and risers. This can be helped considerably by placing a wax pad around those areas of the pattern. This can be accomplished by actually placing small strips of wax at any areas where large plastic concentrations occur, or by dipping that part of the set-up in molten wax. The wax cushion melts and flows out of the mold before the critical expansion temperature of the plastic is reached, thus leaving room for the plastic to expand without pushing against the investment.

If flasks are made of too thin metal, cracking of molds is much worse than if heavier gage material is used. It was found that stainless steel sheet of no less than .060-inch thickness should be used for flasks. Experiments were made using stainless steel flasks of .037 and .060-inch thickness, respectively. All of the castings in the lighter flasks exhibited more flash or fins than those in the heavier flasks. Similarly, casting the same parts in both square and round flasks resulted in more flash or fins on those cast in square flasks than those cast in round flasks of the same gage.

Melting—Melting can be done in the usual types of equipment, except that very small furnaces are used. High melting point alloys can be melted in carbon arc or induction furnaces. Lower melting point alloys can be melted in induction furnaces, or in oil, or gas-fired stationary or tilting furnaces. Usually silicon carbide or clay-graphite crucibles are used for low melting point alloys due to their ability to retain heat while metal is being carried to molds, and because they do not tend to contaminate the metals with undesirable impurities. In any case, good temperature controls should be exercised.

Experiments have shown that with small electric arc furnaces, an optical pyrometer is likely to give erratic readings due to reflection from the walls of the furnace and the short space of time in which to obtain the measurement. It has been found that optical pyrometer readings varied as much as 100° F from reading obtained by the immersion type (noble metal) thermocouples.

For lower melting point alloys the standard alumel-chromel or similar immersion type thermocouples may be used. To assure accurate measurement, it is recommended that closed end thermocouples be used. These are less likely to give erratic readings than are open end types for most metals. Many portable pyrometers of this type, capable of measuring up to 2500° F, are available and can be used either while the pot is in the furnace or anywhere in the shop where metal is being poured.

As in other foundries, metals are subject to gas pickup during melting and usual fluxing or degassing methods used in other types of foundries should be applied to the metal. In addition to gas pickup, high melting point alloys may pick up solid in-

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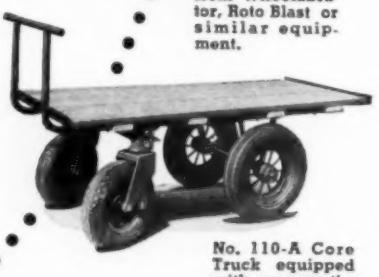
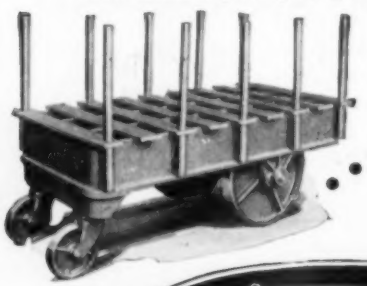


No. 110-A Core Truck equipped with pneumatic-tired wheels and ball bearing swivel casters.



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clusions from the furnace and ladle linings if overheated.

Induction furnaces offer three distinct advantages: (1) they give well stirred metal, thus assuring uniform composition, (2) temperature control is accurate, and (3) due to (1) and (2) chemical analyses may be closely controlled.

Pouring—There are four possible methods of pouring investment castings: (1) static pour, (2) centrifugal pour, (3) applied pressure, (4) vacuum. There have been reports of successful vacuum casting, but the author's experience has included only the first three methods.

If a part can be poured statically with good results, then there is no reason to pour it in any other manner. Usually, however, due to the small size and thinness of investment cast parts, it is necessary to apply additional force to assure complete filling of the mold. This force can be supplied by centrifugal action. For low melting point alloys it can also be obtained by pouring the metal statically and immediately lowering a pressure head over the mold and literally blowing the metal into the mold. In the case of high melting point alloys, melted in small arc furnaces, a similar method is available. Air pressure can be tapped into the center-sides of each furnace and a quick acting valve installed. When the metal is ready to pour, the mold is fastened to the top of the furnace. The furnace is quickly upended and simultaneously the air pressure turned on, which blows the metal out of the furnace and into the mold.

Apply Air Pressure

Where stationary pressure heads are used, the molds are rapidly placed under the head, poured, and the pressure head tightened to seal against the top of the mold and air pressure turned on. This usually results in sprues which suck down and practically disappear when the pressure blows into the mold (See Fig. 5).

Centrifugal casting requires extremely good co-ordination if misruns are to be avoided, and in general is a more complicated process. Although this method of investment casting is used a great deal, the author in his own experience did not find any cases where centrifugal casting would successfully cast parts which could not be successfully cast by application of pressure.

In the case of applied pressure, two defects were most prevalent: (1) non-fills, and (2) cold shuts or misruns. These in turn were due primarily to two factors: (1) insufficient pressure, and (2) cold metal. Non-fills are castings which have not

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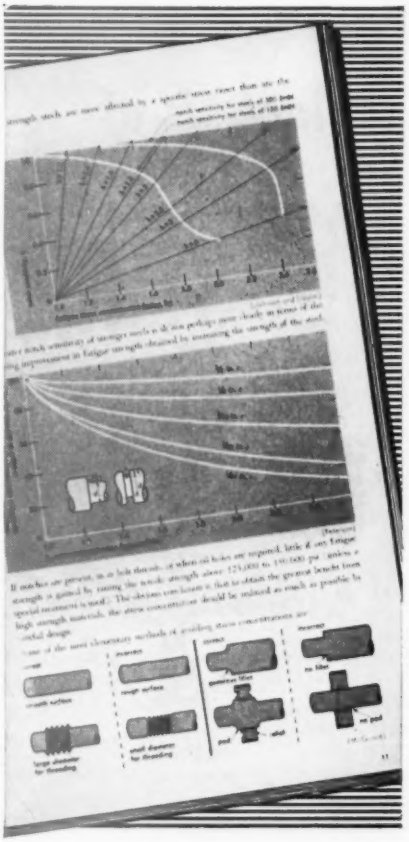

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been completely filled with metal. The cause seems to be lack of pressure. Insufficient pressure is the result of leakage. Pressure is usually maintained solely between the pressure head and the top of the mold. Thus, if a crack forms which extends to the edge of the mold, a pressure leak occurs and full pressure cannot be maintained. Pressure leaks develop along cracks in the ceramic, or at places where patches or ceramic drop off during burnout, or due to improper clamping of the pressure fixture.

In the case of the small arc furnaces not much could be done to correct this. However, in the case of stationary pressure heads, some relief is possible if a pressure chamber is used to surround the mold. For example, a cylinder slightly larger in diameter than the mold, could be sealed tightly to the pressure head of the pressure machine with the bottom left open. This can be lowered around the mold and sealed in rubber or some material which will make a tight seal. Then when the pressure is turned on, the cylinder becomes a pressure chamber and does not have to depend on the top of the ceramic as a seal. This is also helped by substituting quick action valves in place of hand valves so that pressure is on as soon as the valve is touched by the descending cylinder or some similar arrangement.

Misruns are defects where metal did not quite fill sharp corners or recesses or did not run the expected distance in the mold. Cold shuts are defects where streams of metal met but did not merge to form a solid part. Both of these defects are usually due to cold metal.

(To be concluded next month)

References

5. Moore, Thomas T., "Investment Materials For Industrial Precision Casting." THE FOUNDRY, March 1949, p. 196.
6. Soil Mechanics Lab., M.I.T., "Casagrande's Nomographic Chart For Solution of Stoke's Law," Cambridge, Mass.

Gray Iron Foundry Directory Issued

Gray Iron Founders' Society, Cleveland, has released its 1949 directory of members. The 80-page book contains alphabetical and geographical listings of 540 gray iron foundries in the United States and Hawaii. Each listing includes name, address, telephone number, executive personnel, trademark, general types of castings produced, size and weight range of castings manufactured, operating capacity in terms of commercial demand, and type of foundry operation. Copies are available from the society for $10.

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Southern foundry

(*Continued from page* 71)

and carries 108 cars, 4 ft long and 20 in. wide. Cars carry one, two or three molds depending upon dimensions, and rate of travel of the cars is adjustable from 4 to 38 fpm. For large heavy castings the travel is in the low range, while with light castings the speed is in the high range.

On the straight molding line, 16 cope and drag jolt-squeeze, pin-lift and rollover molding machines are arranged along the outside, while on the other conveyor line, 16 cope and drag jolt-squeeze, pin-lift machines are located along the outside. To prevent sand from sticking to sides of the sand hoppers, an electrically operated vibrator is attached to a side of each one. This is actuated by mercury switches on the lever operating the hopper gate. When the lever is pulled down, the mercury switch closes, and opens when the lever is in the normal or horizontal position. As may be observed in some of the accompanying illustrations, the conveyor lines along the molding and pouring stations are mounted about 24 in. above the floor level or about level with the platens of the molding machines. Slightly beyond the pouring station the conveyor lines rise on a slope of about 20 degrees until they reach a height of about 8 ft above the floor. On the return travel the lines descend at about the same angle to the level of the molding machine platens.

Shaken Out on Two Units

Castings from each unit are shaken out of the molds on either of the two shakeouts onto an apron conveyor. Shakeouts are hooded so that any dust and gases are carried off in the exhaust system to which they are connected. The hot castings are elevated on the apron conveyor to a height of 6 ft in a distance of 30 ft and discharged into open-end steel pans or buckets which hold from 2 to 3 tons. When filled the pans are lifted by one of the two 10-ton cranes which span the foundry, and transported to the castings' storage department located on one side near the end of the building. The castings remain in storage from 1 to 8 hours.

Several castings of each type are pulled from the shakeouts at 30-minute intervals and quickly inspected in order that foundry supervisory personnel will have current information as to how the jobs are running.

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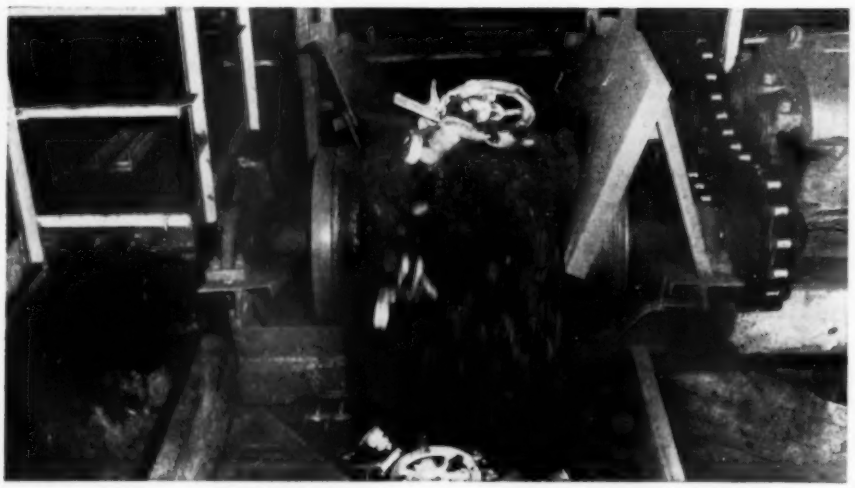

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drops through the grids onto sloping conveyor belts which elevate it to storage bins at the ends of the mold conveyor lines. From the storage bins the sand is screened, reconditioned, and returned to the hoppers located above the molding machines. As the sketch indicates, each unit is equipped with its own sand system, thus two different sands can be run at the same time. Each unit has a capacity of approximately 50 tons of cool sand per hour. Molding sand used generally has a grain size of about 65 AFS grain fineness number with a permeability of 80-110, green compression of 8 to 10 psi, and a moisture content of 3.8 to 4.5 per cent. Sand samples are taken every hour and determinations made for the properties mentioned. Since the molding sand contains seacoal additions, a total carbon determination is made once a day to see that it is within the desired limits of 2.0 to 2.5 per cent.

Clean the Castings

Castings are taken from the storage department in the pans which are loaded on cars and transported to another building close by for cleaning and finishing. Heavy castings, such as flywheel housings, etc., are dumped onto a short belt conveyor which discharges into the loading mechanism of a large abrasive blasting machine located on one side of the building. Smaller castings are cleaned in a similar but somewhat smaller unit on the other side of the building. Certain types of small castings are cleaned in a rotary wet mill. After cleaning the castings are discharged into steel tote boxes holding 2000 lb which are transported to either of two grinding lines located on opposite sides of the building. As shown in Fig. 1, the two wheel stand grinders are located adjacent to conveyor belts, and as the operators complete the grinding operations, they place the castings on the belts. As they pass along they are inspected and are discharged into tote boxes. Tote boxes are transported to the shipping room at the end of the building where they are prepared for shipment. Some types of castings, such as automotive manifolds and water pumps, have to be pressure tight and previous to entering the shipping room are subjected to a water test on any of several machines located nearby for that particular purpose.

Bulk of the cores used at Production Foundries are produced on core blowing machines although some are made by hand on hand-jolt core-making machines. The core department is located at one end of the

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foundry building and the coremaking equipment is arranged compactly. Core sand of 53 and 90 AFS fineness number is purchased dry, or dried in a 30 ft gas-fired rotary kiln, as it has been found that definite additions of moisture, resin binder and cereal to definite quantities of dry sand insure a more uniform product. Cores are being made using phenol formaldehyde resin as the binder.

Core sand mixtures are prepared in a batch type muller and discharged into wheelbarrows for distribution. Core blowing machines are arranged in two groups around circular conveyor tables which are rotated by electric motors. Tables are steel topped, and are 9 ft in diameter. Machines are located around about one-half the periphery of the tables, and the operators place the blown cores in driers or on plates on the tables. These are rotated to bring the cores to the open area from which they are picked up and placed on the trays of the core ovens. Sand is distributed to the core blowing machine hoppers from an elevated platform around them, and which is approached from a ramp.

Baked in Vertical Ovens

Core ovens are the vertical continuous type, and there is one opposite each turntable. Each oven is equipped with dual gas and/or oil burners. Tables and ovens are about 3 ft apart so that little effort is required to move the cores from the tables into the ovens. Average total cycle including baking and cooling is 1 hour and 20 minutes; however, it is adjustable to suit varying requirements. Temperature of the baking zone is maintained at 500° F. After the cores are baked they are removed on the opposite side of the oven, inspected, assembled, and sent to storage or to the molding stations.

As indicated several times, Production Foundries maintains close control on materials and operations, and to that end has a well equipped laboratory for conducting chemical and mechanical property examinations of metals, sands and other materials which enter into the production of its castings. While most of the operations are routine, the laboratory also engages in some research investigations to improve production methods or castings. Its most recent project was the production of nodular iron, the first samples having been poured approximately 1½ years ago. At present it is also carrying on some work on the reclamation of molding and core sands.

Sources of Illustrations

Fig. 2—Modern Equipment Co.
Figs. 3, 4, 5, 6, 7—Jeffrey Mfg. Co.

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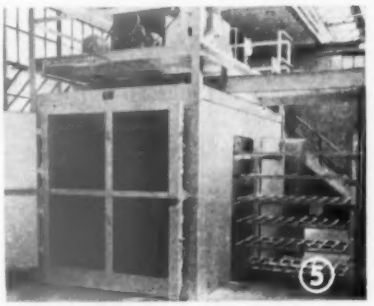
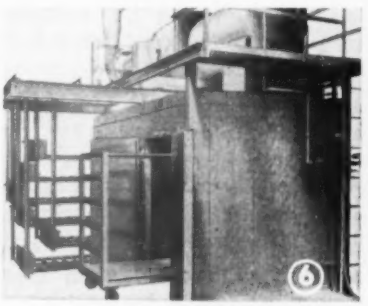


FIGS. 5 & 6—A Combination Shelf. Drawer and Truck Type Oven. Heat is furnished by one efficient Lanly forced convection system.



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MOLDING MACHINE: Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22 — Illustrated catalog on the company's 750-lb jolt, rollover, draw molding machine shows the machine in action in a number of different operating positions and contains a blueprint diagram giving dimensions of the unit.
For More Details Circle No. 90—Page 229

DATA BOOK: Meehanite Metal Corp., Pershing Square Bldg., New Rochelle, N. Y.—Fourth of a series of application and engineering data booklets known as bulletin 31 contains eight pages and provides specific illustrations of unusual applications as well as test data and charts of various engineering characteristics of Meehanite.
For More Details Circle No. 91—Page 229

THERMOMETERS: Illinois Testing Laboratories Inc., 420 North LaSalle St., Chicago 10—Bulletin 2451-C describes all sizes and types of the company's distant reading thermometers (up to 1000 ft distant); enumerates the services for which each type is best suited; gives installation and operation instructions; and lists prices for every instrument.
For More Details Circle No. 92—Page 229

EQUIPMENT: Allis-Chalmers Mfg. Co., 1032 South 70th St., Milwaukee, Wis.—Three bulletins have been issued dealing, respectively, with alternating current, high speed, coupled type generators; bracket bearing synchronous motors in sizes from 30 to 1000 hp, and a new car shaker.
For More Details Circle No. 93—Page 229

CRANE CAB COOLING: Dravo Corp., Fifth & Liberty Aves., Pittsburgh 22—Bulletin 1300 describes air conditioning systems for crane cabs operating in hot or contaminated atmospheres. Specification data sheets are included for three different models of conditioning equipment.
For More Details Circle No. 94—Page 229

STORAGE BATTERIES: Gould Storage Battery Corp., 467 Calhoun St., Trenton 7, N. J.—Battery selector bulletin GB-1055 is intended as a guide for purchasing agents, plant engineers, materials handling supervisors, and battery room foremen, in selecting correct batteries for industrial trucks.
For More Details Circle No. 95—Page 229

INSTRUMENTS: Wheelco Instruments Co., 847 West Harrison St., Chicago 7—Bulletin AC-1 and price lists describe measuring, indicating signaling and recording instruments including alternating and direct current voltmeters, milliammeters and ammeters; and direct current millivoltmeters and microammeters.
For More Details Circle No. 96—Page 229

FACE SHIELDS: Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh 8—Bulletin describes face shields for protection in handling acids and other chemicals, pouring hot metal, sanding, grinding, and other operations where face and eyes are endangered by light, flying particles.
For More Details Circle No. 97—Page 229

CORROSION RESISTANCE: Cooper Alloy Foundry Co., Bloy & Ramsey Ave., Hillside 5, N. J.—Bulletin on corrosion resistance of stainless, monel and nickel castings is designed to aid materials engineers in selecting the best alloy when the corrosive agents and conditions are known.
For More Details Circle No. 98—Page 229

CASTINGS: Eaton Mfg. Co., Foundry Division, 9771 French Rd., Detroit 13—Booklet incorporates a number of company advertisements which appeared in various trade publications, describing the use of permanent mold gray iron castings in a variety of products.
For More Details Circle No. 99—Page 229

EQUIPMENT: Acme Equipment Co., 126 South Clinton St., Chicago 6—Bulletin 92 on new and used war surplus industrial items lists such products as fire extinguishers, lift trucks, hoists, cranes, machinery, special equipment, and miscellaneous items. Prices are included.
For More Details Circle No. 100—Page 229

METALLIZING: Wall Colmonoy Corp., 19345 John R St., Detroit 3—Booklet describes the company's powder metallizing gun for metallizing and welding operations using the company's special powdered metal or powdered brass, copper, zinc, and other metals.
For More Details Circle No. 101—Page 229

VIBRATION CONTROL: Korfund Co., 48-39-F, 32nd Place, Long Island City 1, N. Y.—Bulletin describes a cork and rubber mounting material for controlling transmission of vibration and noise. Methods of installation are described and illustrated.
For More Details Circle No. 102—Page 229

EQUIPMENT: Barrett-Cravens Co., 4609 South Western Blvd., Chicago 9—Bulletin 4881 presents various materials handling equipment, including

hand trucks, racks for draining barrels and drums, stacking frames, a lifter and skid system, rectangular and triangular dollies, and other items. Representative lift trucks, portable elevators and storage racks also are shown.
For More Details Circle No. 103—Page 229

MELTING POTS: Meech Avenue Foundry Inc., 9906 Meech Ave., Cleveland 5— Illustrated brochure covers five types of melting, holding and tilting pots which have been developed for use in aluminum foundries, die-casting plants, smelting works and battery plants. Pot capacities range from 50 to 10,000 lb.
For More Details Circle No. 104—Page 229

LIFTERS: Pucel Enterprises Inc., 3746 Kelley Ave., Cleveland 14— Leaflet describes nine models of lifters designed to be used in conjunction with a crane or hoist for holding and lifting bulky and awkward materials.
For More Details Circle No. 105—Page 229

PAINT: Speco Inc., 7308 Associate Ave., Cleveland 9—Data sheet and application bulletin covers high heat resisting aluminum paint said to be suitable for use on all interior or exterior hot surfaces subject to 1000 to 1500° F.
For More Details Circle No. 106—Page 229

BELT CONVEYORS: Continental Gin Co., Industrial Division, Dept. O, P. O. Box 2614, Birmingham 2—Illustrated engineering data book, ID-481, includes engineering and application data, dimensions and list prices on belt conveyors.
For More Details Circle No. 107—Page 229

TRACTOR SHOVEL: Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.—Uses of one model of the company's line of tractor-shovels for handling loose materials is presented in an interesting editorial manner in a new folder.
For More Details Circle No. 108—Page 229

CASTING SEALER: Tousey Varnish Co., 520 West 25th St., Chicago 16—Booklet describes the company's services, operations and plant facilities in the manufacture of casting sealer and industrial paint products.
For More Details Circle No. 109—Page 229

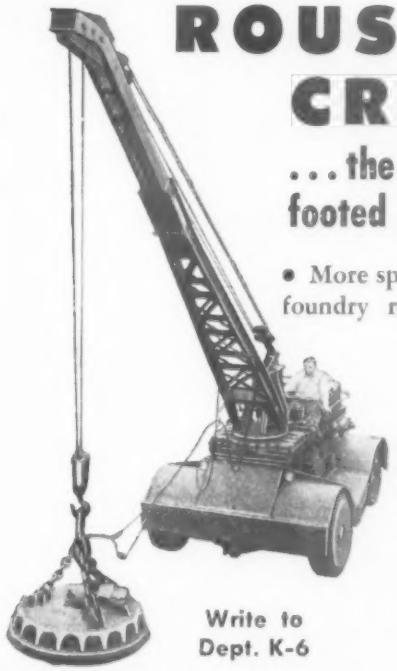
SURFACE GRINDING: Sterling Grinding Wheel Division, Cleveland Quarries Co., Tiffin, O.—Folder describes the company's chuck and abrasive segments for surface grinding operations.
For More Details Circle No. 110—Page 229

AIR HEATERS: Surface Combustion Corp., P. O. Box 907, Toledo 1, O.—Illustrated bulletin SC-143 covers gas-fired air heaters and their applications.
For More Details Circle No. 111—Page 229

Cut handling costs around your foundry with

ROUSTABOUT CRANES

...the fast tractor-footed load hustlers



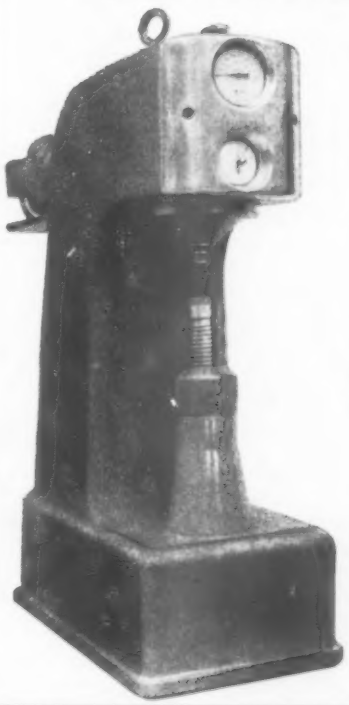
• More speed, less cost in handling your foundry raw materials and castings—and better conditions for workers. Roustabout has magnet for scrap, castings; bucket for sand, coal, coke. Goes anywhere, built for years of overwork. Many foundries enthusiastic about Roustabouts — write for the economy and efficiency facts today.

Write to Dept. K-6

HUGHES-KEENAN CORPORATION
DELAWARE, OHIO, U. S. A.
Load-Handling Specialists since 1904

Brinell Testing

at PRODUCTION LINE SPEEDS



Simply set tolerance hands on the lower dial of this Brinell Hardness Tester to the desired limits and the operator merely notes that the indicator points stop within them.

No grinding or preparation of parts is necessary. Foot operation permits free use of both hands. Tests are completed as rapidly as the operator can handle the parts.

Standard Brinell test loads are used . . . machine is motor-driven . . . loads are applied hydraulically . . . round and flat parts are handled equally well.

GET FURTHER DETAILS
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DETROIT TESTING MACHINE CO.
9390 GRINNELL AVENUE . . . . . DETROIT 13, MICH.

SPECTROCHEMICAL ANALYSIS

SIMPLIFIED

. . . analysis completely made by a single technician

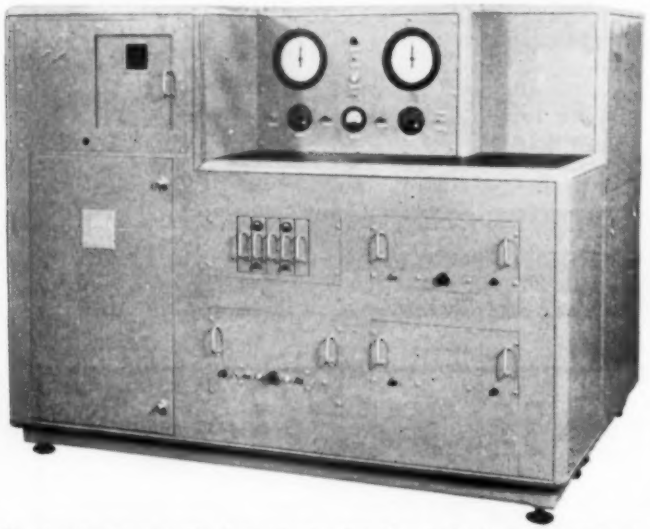
SPEEDED

. . . simultaneous determination of eight constituents obtained in 40 seconds

MECHANIZED

. . . line intensities automatically indicated on large, easily read dials

with the Baird Associates-Dow
DIRECT-READING SPECTROMETER



- **Production control analysis,** for the desired constituents, is obtained within 40 seconds after the operator has pushed the button that initiates the automatic analyzing cycle. The analysis requires no photographic darkroom, no specialized operating techniques, and no reading of graphs.
- **Precision of analytical determinations,** especially for low values, is equal or superior to that of present photographic means.
- **The operating principle** of the direct reading spectrometer involves spectral measurement of a spark or arc struck between two electrodes. The intensity of individual spectrum lines is measured with respect to standard lines by photomultiplier tubes; and the output of these tubes, suitably amplified, is used to trigger circuits that control indicating timers calibrated directly in concentration units.

Other special apparatus produced by Baird Associates, Inc. over the past decade include spectrographs, spectrographic power sources, densitybalances, infra-red spectrophotometers, microphotometers, infra-red gas analyzers, and Rayleigh interferometers.

Baird Associates-Dow Direct-Reading Spectrometer offers the advantages of faster control analyses and restoration of skilled laboratory staffs to other functions. For detailed information, request Bulletin 26.

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INDUSTRIAL PHYSICISTS
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HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST
because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS
because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES
chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

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ORWELL, OHIO • U. S. A.
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ARE YOU A CAVE DIGGER?

Kids digging caves in sand banks or hillsides help explain why materials "hang-up" or bridge over in hoppers and bins.

Materials are both cohesive and adhesive. Moisture, superimposed loads and hopper and bin design all contribute to stoppages.

Why Dig Caves? Prodding—sledging or hammering are slow and expensive ways of keeping materials flowing.

Install "BRANFORD" Pneumatic Vibrators
and materials will flow freely and production will speed up.

Send size and shape of hoppers—wall thickness—capacity and nature of material—we will recommend the proper equipment and quote.

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SERVICE SALESMANSHIP

It has always been Bloomsbury practice to employ salesmen with practical Foundry experience, not merely to sell Bloomsbury Products but to advise how to use them most effectively to

GUARANTEE CLEAN CASTINGS

Put your problems up to

BLOOMSBURY GRAPHITE COMPANY

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SINCE 1882

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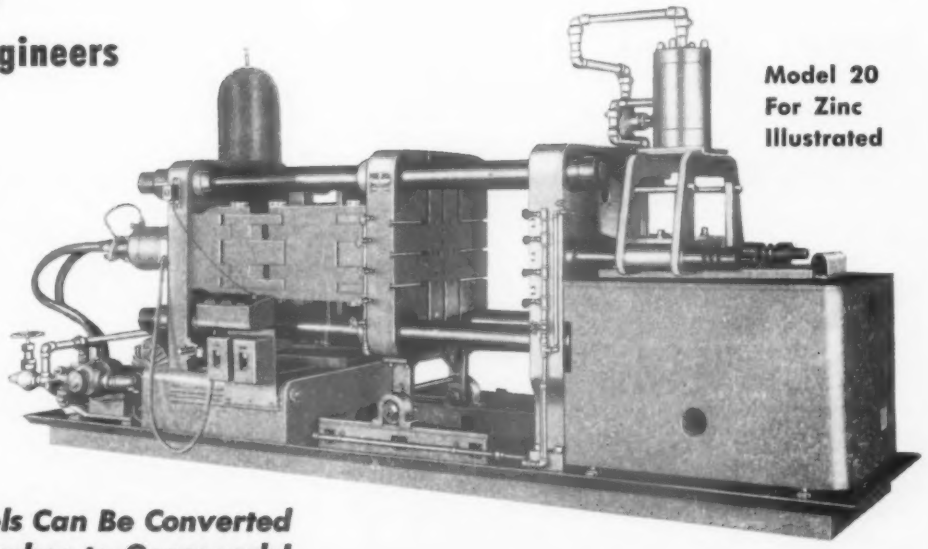
CAST-MASTER *Die Casting Machines*

Precision Built by Die Casting Engineers

● Cast-Master Die Casting Machines are designed and built by engineers with years of experience in the Die Casting Industry. Each model has been given months of actual operation under the most severe conditions. You'll find a CAST-MASTER geared for years of trouble-free operation plus high speed production at a minimum cost.



Model 20 For Zinc Illustrated

All Cast-Master Models Can Be Converted From Cold Chamber to Gooseneck!

MILLER·TAYLOR TOOL CO.
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Send for New Catalog Showing Complete Line of Cast-Master Die-Casting Machines.

Here's another advantage of the . . .

Heroult

GANTRY-TYPE

ELECTRIC MELTING FURNACE

Platform is attached to and tilts with the furnace, providing continuous working area during the charging and melting.

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General Offices: *Frick Building, Pittsburgh, Pa.*

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UNITED STATES STEEL

Why Pipe Heat All Over?

DRAVO *Counterflo* HEATERS *make it where it's used . . .*

Why waste cash on costly distribution systems to pipe heat all over your plant? Dravo *Counterflo* Heaters *make* it right where it's *used,* blanket working areas of 4,000 to 20,000 sq. ft. per unit with production-stimulating warm air.

Counterflo Heaters also provide ventilating air in summer. 100-150-foot air throw; no ducts needed for large open areas. Oil or gas-fired, readily converted. 80-85% efficiency. Only power, fuel and vent connections required for installation. Stainless steel combustion chamber, rugged mill-type construction, AGA approved and UL listed. Reported total installed cost 50 to 66% less than wet-type systems. Ask for Bulletin DG-523-4.

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FASTER AND BETTER

with the

MURPHY PISTOL SPRAYER

ELIMINATES SWAB, BRUSH and SPRAY CAN

BLACKENING REACHES HIDDEN POCKETS
MOLDS ARE BLACKENED FASTER
CASTINGS PEEL BETTER
WORK COMES CLEANER

Satisfactory Performance Guaranteed or Money Back!

PRICES COMPLETE WITH SUCTION HOSE AND SINKER

PIPE SIZE	1/16"	1/8"	1/4"	3/8"	1/2"
PRICE F. O. B. HAMILTON, O.	$12.00	$12.00	$12.00	$14.50	$18.00

Used for Silica wash, oil, water or any liquid material. For sand-blast cleaning. As a blow gun for cleaning motors and machinery. If your dealer cannot supply you at once, order direct from manufacturer below. Literature on request.

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Moisture Elimination Up To 3000 Pounds Per Square Inch

Use *Self-Dumping* Containers

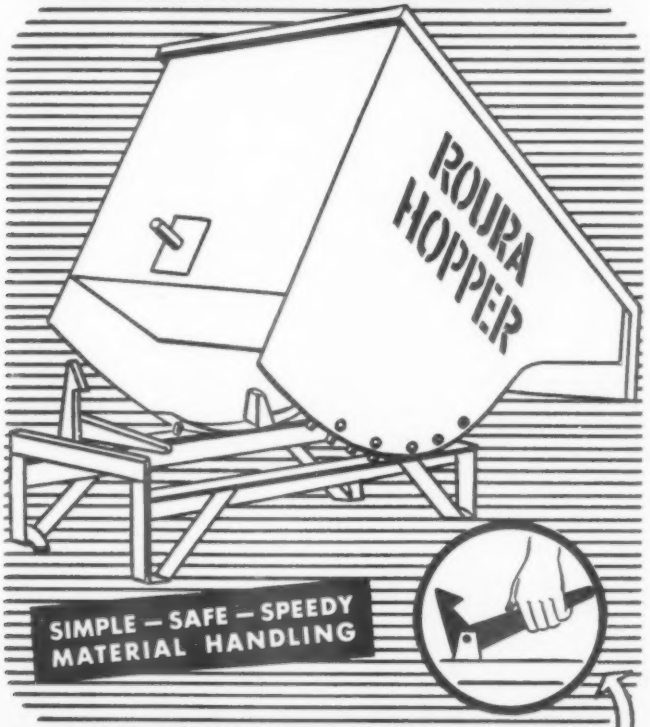
Reduce FATIGUE

WHILE YOU

Step Up PRODUCTION 50%

WITH

ROURA *Self-Dumping* HOPPERS



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Only ROURA Has the Exclusive Instant Release (Patent Pending) Handle

Handling wet or dry, hot or cold, bulky materials quickly and easily, the ROURA is simple to operate—only one man is required for distributing and unloading—and he does this in much less time than ordinarily required under old-fashioned manual methods. Thousands of Roura Hoppers (which fit any standard fork or platform lift truck) are in constant daily operation, serving and saving for such firms as Owens-Illinois Glass, Corning Glass, National Fireproofing, General Motors, Ford, Chrysler, American Brake Shoe, General Electric, Westinghouse, Western Electric, American Steel Foundries, International Harvester, John Deere, etc.

By a simple lift of the exclusive release handle, the ROURA HOPPER dumps, rights and locks itself securely. Sizes—½, ¾, 1, 1½ and 2 cubic yards; the ROURA HOPPER can also be designed for flat trucks and in other sizes to meet specifications. Also, it can be equipped with special flanges that permit stacking to desired tiers for storage or future distribution of materials—conserving valuable floor space. Priced below all competition, the ROURA will quickly pay for itself many times over.

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☆ Marschke Heavy Duty Floor Stands are massive. All of the weight is in the right places—Marschke's engineers put every pound into these uncontested heavyweight champions for an express purpose.

The net result—to you—is that really smooth spindle rotation which every user knows is *essential* for maximum service out of high priced wheels. Vibration—the abrasive eater—cannot be eliminated *excepting* through enough mass to absorb the stresses and strains—and the shock of sudden heavy loads.

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Over 70 specifications of Swing Frame, Floor Stand and Pedestal Grinders—and Buffers . . . 1 HP on up.

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Castings of Wright quality now available...

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Wright Aeronautical now provides complete foundry facilities to manufacturers in need of high-quality aluminum and magnesium castings. This quality is assured because . . .

(1) Our foundry has specialized in the production of lightweight, top quality castings for aircraft engines for 27 years.

(2) Our skilled inspectors maintain a rigid control on quality through full metallurgical analysis and precision inspection of all casting fabrication. This modern foundry has the capacity and equipment to make castings in almost any desired quantity, size, type or design, however intricate.

Wright Aeronautical Foundry Offers

1. A wood and metal pattern shop equipped to handle the most intricate foundry patterns.
2. A materials laboratory for testing and approving all materials used in casting fabrication.
3. Equipment for *green* and *dry* sand castings.
4. Accurate temperature control of all melting and pouring operations.
5. Precise dimensional and finish inspections, utilizing Fluoroscope, X-ray and other precision tools.
6. Complete heat treating equipment for treating finished castings.
7. Facilities for all surface treatments — anodizing, dichromating, impregnating, painting.
8. Prompt deliveries and competitive prices.

For further particulars, write Dept. F1, Industrial Sales Department.

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A DIVISION OF CURTISS-WRIGHT
FIRST IN FLIGHT
WOOD-RIDGE · NEW JERSEY

No. 4 DAYTON RING VALVE BENCH RAMMER

MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

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Manufacturers of Pneumatic Tools Since 1903

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Casting Sealer and Impregnator

Eliminate "Rejects"!
Cut Labor Expense!
Do Away With Material Waste!

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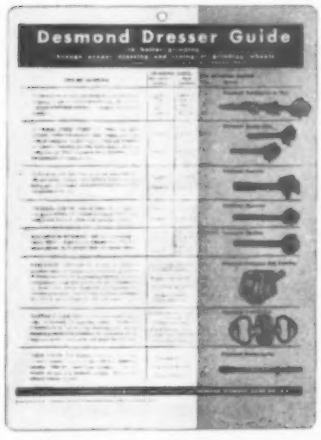
Practical tips . . . on easier grinding at lower cost



Desmond's exclusive Diamo-Carbo Dresser is a favorite tool for shaping, dressing and truing small wheels on bench grinders and saw gumming wheels . . . For general use; soft and medium grade wheels, use Desmond Diamo-Carbo Dresser No. 3; for small wheels, use the No. 8; and for large wheels, No. 00.

Ask your industrial distributor for the new Desmond Dresser Guide, a handy 9" x 12" wall chart which gives you good practical data on use of dressing tools . . . The Desmond-Stephan Mfg. Co., Urbana, Ohio

Desmond

the only complete line of grinding wheel
DRESSERS & CUTTERS

OPEN HEAD
Radiator Chaplet

Supports Cores Better
REDUCES CASTING MAKE-OVERS

SAND PACKS SOUNDER UNDER HEAD AND AROUND THE STEM

By enabling you to avoid failures in core support, this chaplet pays off in reduced casting rejects and better deliveries.

We also make Square Head Radiator Chaplets, Motor, Boiler, Forged Head, Fitted Head and Double Head Chaplets. *Write for Bulletin No. 48*

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West 67th St. & N.Y.C. Ry.
CLEVELAND, O.

CLEVELAND *Chaplets*
Since 1890

Here is a chronology of

RADIUM RADIOGRAPHY *that will greatly interest manufacturers of steel castings:*

1930— First commercial use of gamma rays; radiograph made of sternpost of cruiser "Chester".

1935— First purchase of radium for industrial radiography by Westinghouse; bought from Radium Chemical Co., Inc.

1938— AFA questionnaire revealed that 8% of steel casting men used radium radiography.

1941— 22% of steel casting men bought, rented, leased or employed radium for radiographic purposes.

1946— 150 steel foundries rented or leased radium.

1948— 200 steel foundries rented or leased radium.

PORTABILITY
SIMPLICITY OF OPERATION
SIMPLE APPARATUS
MAY BE BOUGHT,
RENTED OR LEASED.

The swing to radium radiography is not accidental: it is a deliberate move by steel casting people who want to improve their production and effect economies. The apparatus is absurdly simple, requires no special training to operate, and, most important, involves no capital expenditure. Illustration shows a large number of castings being radiographed simultaneously. The apparatus may be bought, leased or rented. This is a sound, commercial proposition, and you really owe it to yourself to investigate our claims. Write today for additional information.

RADIUM CHEMICAL CO. INC

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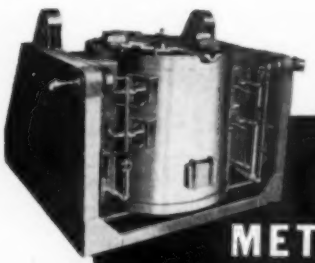
3723 Wilshire Blvd., Los Angeles 5, Cal.



'Surface'

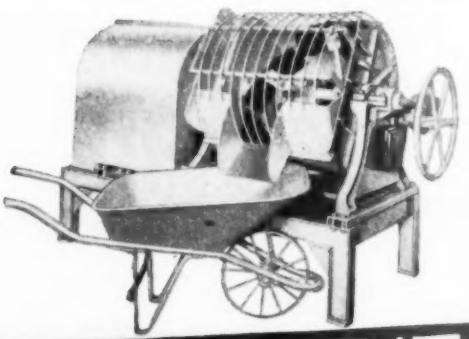
NON-FERROUS
METAL MELTING FURNACES

SELECTION TABLE

	TYPE	Max. Temp.	Series	Recommended for	Bulletin No.
TILTING	CRUCIBLE	2500°F.	TCR	Melting Brass and Copper	TC-45
		1400°F.	TCA	Melting Aluminum	TC-45
	POT	1400°F.	TP	Melting Aluminum and Magnesium	TP-45
STATIONARY	CRUCIBLE	2500°F.	CR	Melting Brass and Copper	CR-45
		1400°F.	AC	Melting Aluminum	AC-45
	POT	1400°F.	AM	Melting Aluminum	AM-45
		1200°F.	SM	Melting Soft Metals	AM-45
		1000°F.	SA SAV	Melting Soft Metals	SV-49

Write for Complete Specifications

SURFACE COMBUSTION CORPORATION
TOLEDO 1, OHIO



BLYSTONE
• MIXERS •

THE paddle-type mixer for core sand mixing in the foundry. Blystone Mixers offer: low mix cost, thorough mixing, and easy operation. There is a sturdily built type and size for your problem. Send for Bulletin and full details.

• BLYSTONE DIVISION •
STANDARD SAND & MACHINE CO
549 W. Washington Boulevard, Chicago, Illinois

"Oliver" Double Arbor Tilting Saw Bench

Rip and cross-cut on one machine

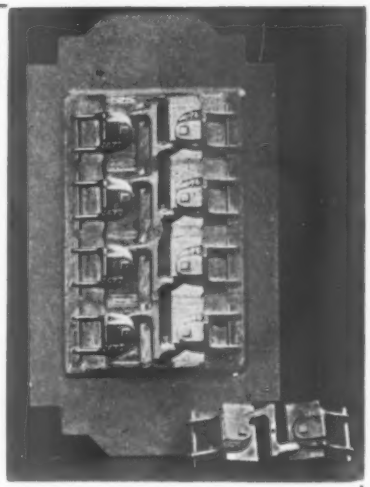
This double-duty machine saves valuable time. A shaftless motor is built directly on each of the two saw arbors. Either rip saw or cross-cut saw can be brought into action by turning the handwheel. Table remains horizontal while saw tilts up to 45°. Arbors can be adjusted vertically. Rips up to 24¼" wide, cross-cuts up to 36" wide. A 16" saw projects 3¾" through table. Dadoes up to 4" wide. Cuts a perfect miter. Most complete and accurate set of gauges.

Write for Bulletin No. 260-D

OLIVER MACHINERY COMPANY
GRAND RAPIDS 2, MICHIGAN

Where Production is the first Consideration,

Pressure Cast Aluminum Matchplates and Cope and Drag Plates are the only Satisfactory Answer



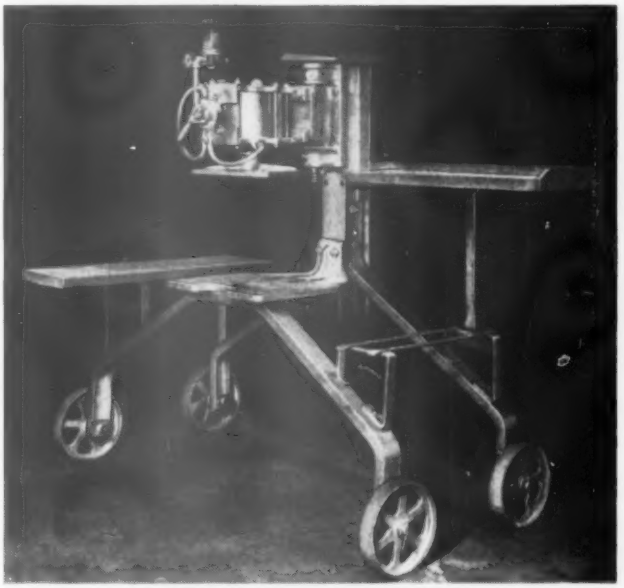
Only one master pattern does it! From it we make you single or multiple pattern matchplates, casting them under pressure in plaster molds. Why not find out exactly how much we can save you by this method, or by furnishing cope and drag plates which likewise jump production and lower your costs?

Get our quotations today.

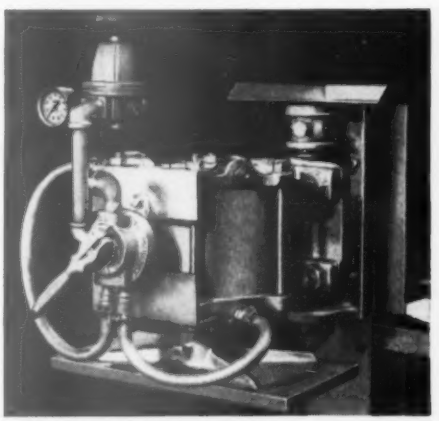
PLASTER PROCESS CASTINGS COMPANY
6922 Carnegie Avenue Cleveland 3, Ohio

Pressure-Cast MATCHPLATES
COPE and DRAG PLATES

GET FASTER, EASIER PRODUCTION WITH A NEW MOLINE 55 AIR SQUEEZE MOLDING MACHINE



MOLINE 55 MOLDING MACHINE WITH PNEUMATIC HANNIFIN CYLINDER



CLOSE UP VIEW OF HANNIFIN PNEUMATIC CYLINDER

The new 55 heavy duty portable features a pneumatic cylinder for smooth, full power performance. Air replaces muscle enabling a molder to put up more molds faster and with less fatigue. Larger flasks and heavier jobs can be handled more effectively. The new 55 increases production and lowers foundry costs. It is ruggedly constructed for heavy duty and designed for smooth, simple, economical operation. Molders like them!

OVER SEVENTY YEARS OF SERVICE

WRITE FOR FURTHER INFORMATION AND PRICES

MTW

MOLINE IRON WORKS
MOLINE, ILLINOIS, U.S.A.

WE SHIP QUICK

ATLANTIC Band Saws

The Favorite Blades of Non-Ferrous Foundries for Over 20 Years

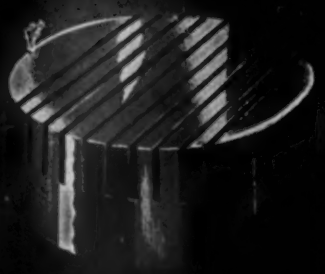
You will profit by using the tougher Atlantic blades for clean, speedy cutting of gates and risers from castings. You can eliminate unnecessary grinding operations—our specially milled tooth construction makes it easier to cut closer to the body of the casting. All Atlantic Metal Cutting Band Saws are guaranteed as to material, workmanship and temper.

Send for Atlantic Band Saw Catalog, describing foundry cut-off operations.

ATLANTIC SAW MANUFACTURING CO.
Exclusively Band Saw Production

159 BREWERY ST., NEW HAVEN 11, CONN.

Precision



CORE BOX VENTS

Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock.

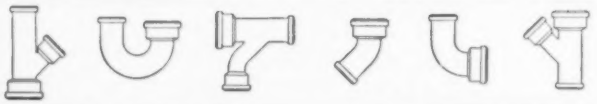
BRASS SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

STEEL SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SCREEN TYPE CORE BOX VENTS
Mesh: #30, #40, #50.
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SPECIFICATION CIRCULAR ON REQUEST

Wm. **DEMMLER** *& Bros.*
Kewanee, Illinois



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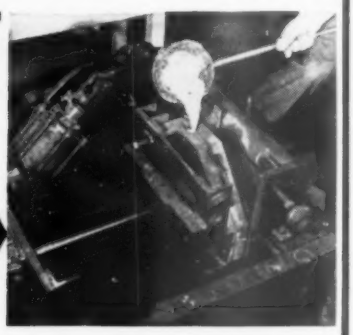

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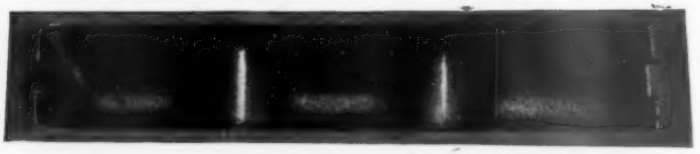

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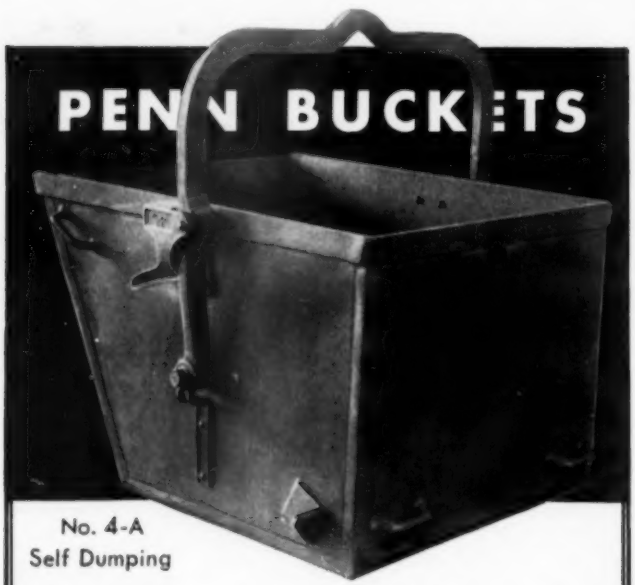

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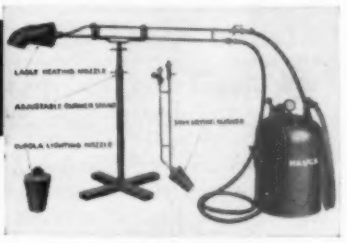

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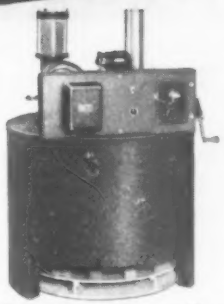

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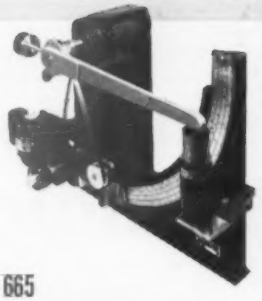

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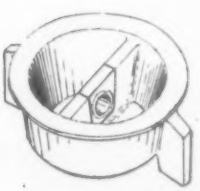

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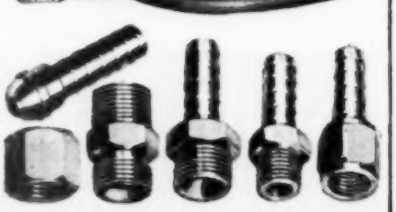

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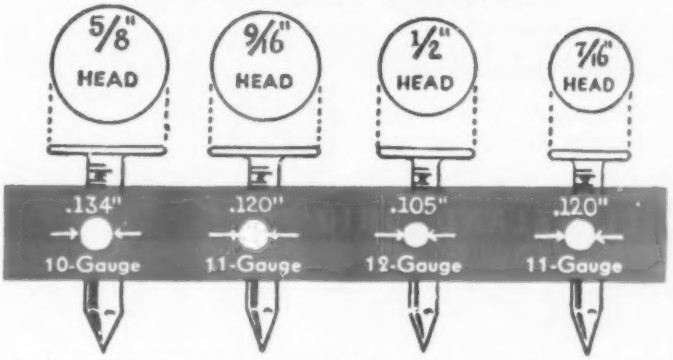

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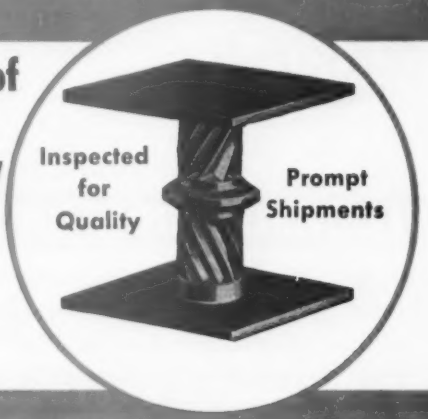

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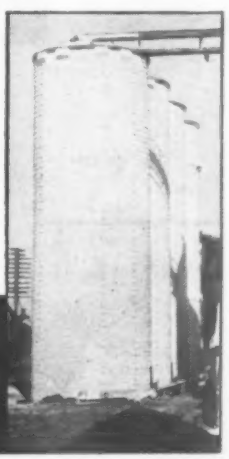

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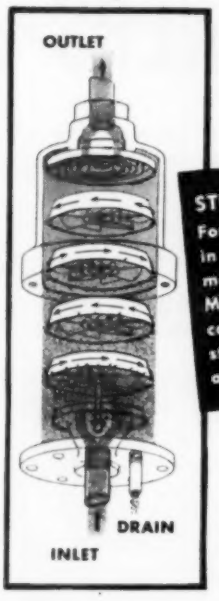

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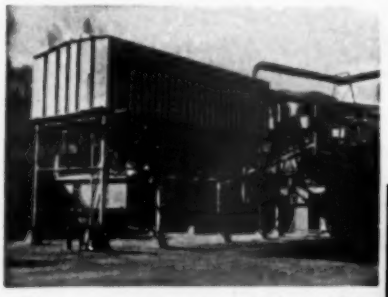

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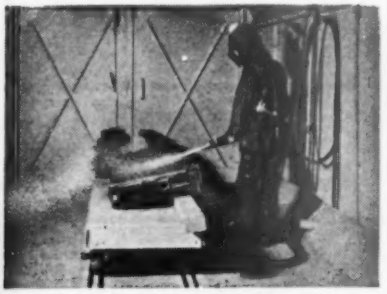

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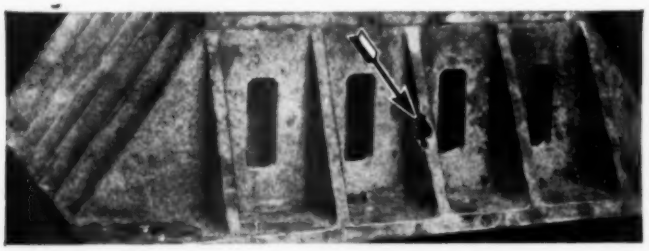

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Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.
Plastic Corp. of Chicago, 2444 So. Central Ave., Cicero 50, Ill.

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Bakelite Corp., 300 Madison Ave. New York 17, N. Y.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

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Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., Toledo 5, O.
Newaygo Engineering Co., Newaygo, Mich.

CORE DRIERS (Dielectric)

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.

CORE GRINDERS (Power Operated)

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Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.

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Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
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Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
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Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

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Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
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Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England
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Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

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Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.
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Kirk & Blum Mfg. Co., Cincinnati 25, O.
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Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

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Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington St., Chicago 6, Ill.
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Multiplex Machinery Corp., Elmore, Ohio
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National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Simplicity Engineering Co., Durand, Mich.

SCREENS (Vibrating)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Ajax Flexible Coupling Co., Westfield, N. Y.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.

SEA COAL

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.

SEPARATORS (Abrasive)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

SEPARATORS (Air, Moisture, Oil)

American Air Filter Co., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Logan Engineering Co., 4913 Lawrence Ave., Chicago 30, Ill.
Jas. A. Murphy & Co., Hamilton, O.
Pangborn Corp., Hagerstown, Md.

SEPARATORS (Magnetic)

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

SHAKE-OUT MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

SHAKE-OUT MACHINERY (Cont'd.)

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.
Productive Equipment Co., 2926 W. Lake St., Chicago 12, Ill.
Robins Conveyors, Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.

SHOT AND GRIT

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Steel Abrasives Co., Galion, O.
Carpenter Brothers, Inc., 600 West Wisconsin, Milwaukee 3, Wis.
Clayton Sherman Abrasives Co., 3896 Lonyo Rd., Detroit 10, Mich.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Foundry Service Co., Birmingham, Ala.
Globe Steel Abrasive Co., Mansfield, O.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Steel Shot & Grit Co., Inc., 39 Warren Ave., Boston, Mass.

SHOT (Peening)

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Steel Abrasive Co., Galion, O.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, Ohio.
Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
Steel Shot & Grit Co., Inc., 39 Warren Ave., Boston, Mass.

SHOVELS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.

SHOVELS (Power)

Frank G. Hough Co., Libertyville, Ill.

SILICA FLOUR

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, O.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

SILICOMANGANESE

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

SILICON (Briquets)

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, Ohio

SILICON CARBIDE (Briquets)

Carborundum Co., Perth Amboy, N. J.

SILVERY PIG IRON see Pig Iron (Silvery)

SKIMMER BARS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

SKIMMERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

SKIP HOISTS

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Gardner-Denver Co., Quincy, Ill.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

SLIP FLASKS

Adams Co., Dubuque, Iowa.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

SLINGS (Chain)

Jeffrey Mfg. Co., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
S. G. Taylor Chain Co., Hammond, Ind.

SLIP JACKETS

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

SMELTERS & REFINERS

Federated Metals Div. American Smelting and Refining Co., 120 Broadway, New York 5.
Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.

SNAGGING BELTS

Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.

SNAGGING WHEELS—See ABRASIVE WHEELS

SNAP FLASKS

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

SODA ASH

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Hercules Powder Co., Wilmington 99, Del.
Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Solvay Sales Division Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

SOLDER

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

SPACE HEATERS

Dravo Corp., Neville Island, Pittsburgh 25, Pa.

SPECIAL FOUNDRY ALLOYS

Niagara Falls Smelting & Refining Div. Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

SPECTROMETERS

Baird Associates, 333 University Rd., Cambridge 38, Mass.

SPOT WELDING APPARATUS

Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.
Murphy & Co., Jas. A., Hamilton, O.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.

SPRUE CUTTERS

Adams Co., Dubuque, Iowa
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee, Wis.

STEEL (Structural)

American Bridge Co., Pittsburgh 19, Pa.

STOKERS (Spreader type)

Standard Stoker Co., Inc., 1701 Gaskell Ave., Erie, Pa.

STRAIGHTENING MACHINES (Malleable Iron)

Hydraulic Press Mfg. Co., Mount Gilead, Ohio

STRIPPING MACHINES

Adams Co., Dubuque, Iowa
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3228 W. Pierce St., Milwaukee, Wis.

SURFACE TREATMENT METALS

Pangborn Corp., Hagerstown, Md.
N. Ransohoff, Inc., 16 E. 72nd St., Cincinnati 16, Ohio

TAPER PINS

Standard Horse Nail Corp., New Brighton, Pa.

TEMPERATURE CONTROLLERS

Foxboro Company, Foxboro, Mass.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane Columbus 1, O.

TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Steel City Testing Machines Inc., 8843 Livernois Ave., Detroit 4, Mich.

TESTING LABORATORIES

Harry Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

TESTING MACHINES (Tensile)

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Steel City Testing Machines Inc., 8843 Livernois Ave., Detroit 4, Mich.

THERMOCOUPLES

Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane Columbus 1, O.
Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

—When writing advertisers, please mention THE FOUNDRY—

Classified Advertising

Positions Wanted

GREY IRON FOUNDRY EXECUTIVE

Thirty years' experience in the production of quality castings and all phases of foundry operation. Practical and technical. Green and dry sand. Mix iron by analysis. Cupola supervision, grey iron metallurgy, quality control, foundry costs, consulting and advisory work. Address: Box 676, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN OR ASSISTANT

In high production gray iron shop. Age 28, with practical foundry experience from molder to supervisor. Ambitious, trustworthy, cost minded and can handle men. Address: Box 707, The FOUNDRY, Cleveland 13, Ohio.

PRODUCTION CONTROL MANAGER

Experienced in foundry production. System used gives customers information immediately and shows required production to meet schedules. Address: Box 733, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS FOUNDRY WORKING FORMAN

39 years' practical experience on jobbing in copper, bronze, high tin bronze and aluminum. Will make change at once. Go anywhere. Address: 722, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY CONSULTANT

With 45 years' actual foundry experience specializing in problems of mechanical foundries, regulating production and reducing scrap. Address: Box 429, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER AND TECHNICIAN

Wants position with concern purchasing large quantities of ferrous or nonferrous castings and confronted with excessive costs due to a lack of proper coordination between engineering, processing, inspection and casting vendor. Prefer to function out of engineering department in order to carry sufficient authority to get desired results. Address: Box 752, The FOUNDRY, Cleveland 13, Ohio.

ALUMINUM SAND FOUNDRY SUPERINTENDENT OR FOREMAN

Eighteen years' experience in sand foundry practice, twelve years in aluminum. Age thirty-five. Can do own rigging, gating, risering and set up either bench, squeezer or floor. Know melting and handling of aluminum alloys for pressure and x-ray castings. Can figure match plate layout from blueprints. Graduate of Cleveland Trade School in all phases of foundry practice. Would like job in Cleveland vicinity but would relocate for right position. Address: Box 756, The FOUNDRY, Cleveland 13, Ohio.

CONTROLLER-TREASURER

Capable of coordination of office and shop activities; creation and supervision of meaningful reports, methods and procedures; making and following through decisions. Background—assistant to treasurer, industrial engineer, secretary-treasurer of steel foundry. Experience—cost accounting, cost control, standards and incentive systems, credits, insurance, property and inventory control, payroll and office management. Married. Age 34. Prefer southwest. Address: Box 760, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Desires position as foreman or superintendent—23 years' experience. Soil pipe, light jobbing, production, gray iron and nonferrous. Address: Box 750, The FOUNDRY, Cleveland 13, Ohio.

Open Capacity

AVAILABLE CAPACITY

Our foundry has open capacity to supply small and medium size gray iron castings. Send sample. Address: OREGON CASTINGS CO., RD 3, Lititz, Pa.

Capacity Wanted

CAPACITY WANTED

We have light production work for brass foundry. Address: Box 731, The FOUNDRY, Cleveland 13, Ohio.

Engineering Service

Are you getting the maximum production out of your foundry and its equipment? If you don't think so contact—

PALMER E. HANSON

Foundry Production Engineer
648 Crescent Court
Wauwatosa 13, Wis.

I have thirty years' foundry production and jobbing experience to offer—nothing else to sell.

PERMANENT MOLD SERVICE
DESIGN & FABRICATION OF PERMANENT MOLDS

Established for the purpose of supplying a field which is ever increasing in demand.

Additional information and sevices offered will be sent upon request.

KENVIN DESIGN & MACHINE CO.
49 LESLIE LANE NEW HYDE PARK, L.I.N.Y.

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SAMUEL APPELBY
GRAY IRON FOUNDRY CONSULTANT
74 LAMARCK DRIVE TELEPHONE
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IMPROVE QUALITY—REDUCE SCRAP—LOWER COSTS—HEAVY CASTINGS BY CONTROLLED METHODS

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SALARIED POSITIONS
$3,500—$35,000

If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (39 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 DUN BLDG. BUFFALO 2, N. Y.

SALARIED POSITIONS

$4,000 to $30,000. This confidential service for men who desire a new connection will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Address: TOMSETT ASSOCIATES, 1203 BERGER BLDG., PITTSBURGH 19, PA.

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high-grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Opportunities

OPPORTUNITIES

Fully equipped nonferrous foundry located in Detroit — going business — approximately 7000 square feet—building 30 feet high monitor type construction. Will sell or lease very reasonably. Address: Box 654, The FOUNDRY, Cleveland 13, Ohio.

OPPORTUNITY

Want to purchase interest in small brass foundry located in Northern Ohio. Address: Box 732, The FOUNDRY, Cleveland 13, Ohio.

OPPORTUNITY

For a good manager and foundryman interested in going into business for himself as partner in small fully equipped gray iron foundry in Northern Pennsylvania. Must be willing to invest small amount of capital. Address: Box 737, The FOUNDRY, Cleveland 13, Ohio.

OPPORTUNITY

Belgian cast steel foundry properly equipped for manufacture of large series items (rough or machined) high grade steels would like to deal (under license) with American patents having reliable references in the States. Please write to publishers. Address: Box 723, The FOUNDRY, Cleveland 13, Ohio.

OPPORTUNITIES

Newly developed process—Dow thermoplastic matchplates. Non-sweating, 2½ times lighter than aluminum, ready for production. Financial backing required. Address: Box 746, The FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

No. 3 Simplex muller or equivalent
Bucket elevators
Belt conveyors
Shakeout screens

ALLIED FOUNDRY CO., INC.
2 PACIFIC AVE. JERSEY CITY, N. J.

WANTED

Cupola charger. Capacity, one ton metal charge for use on 72" cupola. 220 volts, 3 ph. 60 cycle.

THE BOSTICK FOUNDRY COMPANY
LAPEER, MICHIGAN

SKIP HOIST

Used skip hoist wanted—2 cu. yd. self-dumping bucket. Send full specifications and delivered price to Chicago area. Address: Box 755, The FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

PATTERNS WANTED

For cast iron or aluminum chairs, settees, tables, flower stands, etc. Price, description in first letter. Address: Box 751, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Air compressor to supply 500 actual cfm at 100 pounds pressure. Give full description, age, make, condition, price. Address: Box 730, The FOUNDRY, Cleveland 13, Ohio.

WANTED—MOLDING MACHINES

30" to 36" used jolt rollover draw machine—12" draw preferred.
30" to 36" used jolt pushoff machine. Both machines with 3000 lb. capacity. Address: BOX 735, THE FOUNDRY, CLEVELAND 13, OHIO.

Classified Advertising

Foundries For Sale

FOUNDRY FOR SALE

Corporation desires to sell its gray iron production foundry near Kansas City. Good scrap market and utilities extremely low. Two railroad sidings. Capacity 10 to 15 tons daily. 30,000 sq. ft. floor space, pouring room 300 ft. long with overhead conveyors. Modern core room. Plant well equipped. Location presents many advantages for low cost production with ideal labor situation. Can be used for general manufacturing. Reasonably priced. Address: Box 602, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOR SALE

Now operating on specialized production and jobbing. New steel buildings, cupola, molding machines, overhead trolley and equipment located in Vermont on railroad. Low overhead, good labor conditions. Exceptional opportunity for a foundry man with small capital to take over a ninety year old business. Owner retiring and will sell immediately at a very reasonable price. Address owner at—

24 WILDER TERRACE
WEST SPRINGFIELD MASSACHUSETTS

FOR SALE

Iron foundry with excellent equipment. Good organization. Steady customers. A real bargain.

EDWARD H. ZOLL
INDUSTRIAL PROPERTIES
THROUGHOUT THE EAST
790 BROAD ST. NEWARK, N.J.

FOR LEASE

Gray Iron Foundry—eastern central Indiana, fully equipped, sizeable working inventory, attractive lease proposition available immediately. Large profit possibility with investment of limited operating capital. Address: Box 736, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE OR LEASE

Modern—STEEL FOUNDRY—Mechanized
Located in the rapid growing Northwest. Expertly engineered and equipped. Railroad siding —Deep Water Port—Cheapest electric power from Bonneville and Grand Coulee Dams.
Building (50,000 sq. ft.) and general mechanical layout engineered by one of world's foremost authorities. Property 433' x 226' with R.R. siding full 433' length. One mile to docks of ocean going vessels.
Capacity over 500 tons castings per mo.
All equipment — including Furnaces — Transformers—Cranes—Molding machines—Auto Sand-Handling equip.—Shakeout—Dust collectors and Arrestors—Rotoblast and Sandblasting—Grinders —Core ovens — Blowers — Annealing furnaces—Compressors — Steel Flasks and other misc. equipment all by nationally known manufacturers.
A going concern of fine reputation—Never before offered for sale or lease.
All detailed information immediately furnished upon request. Interested persons urged to act promptly.

BOX 748
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE OR LEASE
WITH PURCHASE OPTION

Iron foundry, located in Bridgman, 10 miles south of St. Joseph, Mich. Here is an opportunity to acquire an exceptionally fine plant suitable for heavy grey iron castings, or production lines. Main building has two crane-covered floors 240 ft. long; steel, brick and concrete construction. Total floor area 50,000 sq. ft. Land—7½ acres inside steel fence. C.&O. R.R. sidings. Stoker-fired boiler serves unit heaters; exhaust fans in roof. This very unusual set-up would justify moving your foundry operations from congested city to small town affording good labor supply where living conditions are excellent. For information, address:

Mr. M. R. GAULT
HANNIFIN CORPORATION
1101 S. KILBOURN AVE. CHICAGO 24, ILL.

For Sale

FOUNDRY OWNERS AND
PURCHASING AGENTS

We offer several aluminum alloy ingots as well as choice lots of mixed scrap castings. Also lots of choice segregated aluminum castings. Save big money on your aluminum requirements. Make extra profits by saving on your metal costs. Immediate delivery.

Box 734
The FOUNDRY Cleveland 13, Ohio

FOR SALE

TURBO BLOWERS (3 Phase, 60 Cycle)

cfm	Pressure	Make	Motor H.P.	Volts	Speed
3500	40 oz.	Spencer	60	440	1800
2200	40 oz.	Spencer	40	220/440	3600
1400	16 oz.	Spencer	220/440 3/60		3600
1050	32 oz.	Spencer	15	550	3500
900	24	Spencer	15	220/440	1800
225	10	Spencer	1	220/440	3600

PRESSURE BLOWERS (3 Phase, 60 Cycle)

2500	7 oz.	Sturtevant	15	220/440	1800
2400	14 oz.	Mahr	15	220/440	3480
1300	16 oz.	Nth. Amer.	10	440	1800
1150	20 oz.	Nth. Amer.	10	220/440	3600
950	16 oz.	Nth. Amer.	7½	220/440	3600
660	20 oz.	A & B	7½	440	3600
550	20 oz.	A & B	5	440	3600
450	6 lbs.	A & B	30	220/440	3450
340	20 oz.	A & B	3	440	3600
250	12 oz.	Gen. Elec.	2	220/440	3600
150	12 oz.	Nth. Amer.	1	220	3600

MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND, OHIO

FOR SALE

Industrial property, brick building, 5,000 sq. ft., 1 floor, 22 ft. ceiling height. Suitable for foundry, factory or heavy warehousing. Located in Northwest Chicago industrial section, adjoining Chicago, Milwaukee, St. Paul Railroad. Will sell as completely equipped gray iron foundry as now operating or without equipment to suit purchaser. Priced for quick sale.

MAJOR FOUNDRY CO., INC.
2001 N. Major Ave. CHICAGO, ILL.

FOR SALE
SAND HANDLING SYSTEM

19 individual moulders' hoppers, two 25 ton sand storage bins, one #50 Beardsley & Piper speed muller with 40 HP motor, magnetic separator with bucket elevator, overhead monorail system and cab controlled electric hoist and monotractor and shell buckets with automatic trips for delivering sand from speed muller to moulders' hoppers.

OLD COLONY FOUNDRY COMPANY
EAST BRIDGEWATER MASSACHUSETTS

MACHINE TOOLS FOR SALE

5—Bullard Vertical Turret Lathes, 42" tables.
5—Bullard two-head Maxi-mills, 42" tables.

All in first class usable condition, complete with motors. Also other machine tools.

THE LOCOMOTIVE FINISHED MATERIAL CO.
ATCHISON, KANSAS

FOR SALE

1—International jolt rollover molding machine 20 x 8", type HDG, serial #58041-2. Can be inspected at our plant and immediate shipment made.

THE EASTERN FOUNDRY COMPANY
BOYERTOWN, PA.

For Sale

FOR SALE

2 Only 4 Ton Model M. Wright Manufacturing Co. Chain Hoists
1—28" Walker York Hot Blast Tilting Furnace
60—Tercod Pedestal Blocks HB-28-11½ HI for above furnace
1—Beardsley and Piper Type MC Screenerator
500#—New 1" Mill Stars
500#—Second Hand 1" Mill Stars
2—Forced Draft Coke Burning Mold Driers
1—6 Ton Model K Cyclone Chain Hoist
1—Sly Duplex Tumbler NTO-30 complete with 5 H.P. motor and reduction gears

THE PRESCOTT COMPANY
MENOMINEE, MICHIGAN

CUPOLA BLOWER

1—Ingersoll-Rand Direct Connected Electric Motor Driven Centrifugal Blower 8700 C.F.M. 1.25# per square inch pressure, 3500 R.P.M. complete with 75 H.P. 3 Phase 60 Cycle 220 Volt 40 Deg. C Rise Ball Bearing, Squirrel Cage, Induction Type, Standard Open Motor, Manual Reduced Voltage Starter, Blast Gate Mechanism for Constant Air Weight Control assembled to 1-R Blast Gate and including two (2) Current Transformers and one (1) Air Weight Ammeter Calibrated in lbs. of Air per minute and also amperes. First Class Condition.

CORE BLOWER

1—Randall Core Blower complete with Clamping device. Practically New.

MOLDING MACHINE

1—#401-C (Johnston & Jennings) Portable Jolt Squeeze Molding Machine. Practically New.

SAND CUTTING MACHINE

1—Size #84 model AA American Sand Cutting Machine with cable reel and 100' 3-conductor rubber cable and plug; Motor driven by 10 H.P. G.E. Induction Motor—model #69A1—Type KT948-4 — Form C — 220 volts, 24.2 amps., 1800 r.p.m., 3 phase, 60 cycles; G.E. oil circuit breaker, 50 amps., 600 volts. Good Condition.

G. & C. FOUNDRY CO.
SANDUSKY, OHIO

FOR SALE

Despatch oven, panel construction body—4 inch insulation. Dimensions: 7' 4" x 6' 0" x 6' 0". Heater oil fired 250,000 B.T.U. per hour, combustion blower and recirculating hot air fan. Operating temperature 450°. For further information write:

AMERICAN & FOREIGN WAREHOUSE CO., INC.
PIER 3, NORTH DELAWARE AVENUE
PHILADELPHIA 6, PENNA.

FOR SALE

One Special Whiting No. 9 model B cupola. Purchased new in 1942.
Cupola blower—one General Electric No. S-367-EI Type FS-367
C.F.M.—8500 Volume 1.25
R.P.M.—3540
One General Electric motor 75 H.P.

BOX 698
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

Two (2) Heroult electric arc furnaces, side door charge, roof removable, complete except that no furnace transformers are included. Electrical control equipment available for one furnace only. In good condition. 8' diameter shell. 7,500 pound capacity.
Two (2) Osborn stationary #332-38 jolt squeeze rollover power draw molding machines. In excellent shape.
Both items are offered for any reasonable price. Space needed.

LEBANON STEEL FOUNDRY
LEBANON, PA.

FOR SALE
BRIQUETTING PRESS

Model 100—Milwaukee Hydraulic for cast iron and steel borings. Purchased 1941—used intermittently—in excellent condition. Price $6750.

KEARNEY & TRECKER CORP.
MILWAUKEE 14, WIS. PURCHASING DEPT.

Classified Advertising

For Sale

EQUIPMENT FOR SALE

PANGBORN SHOT BLAST ROOM

New—never installed. Size 12′ x 25′ with two blast chambers, complete with new Pangborn Dust Collector, 60 cycle A. C. motors.

BEARDSLEY & PIPER SANDSLINGER

Motive Jr. track traveling type; had very limited use—excellent conditions.

BEARDSLEY & PIPER SAND CONDITIONER

In fine condition—used about one year. Magnetic pulley.

SIMPSON SAND MULLERS

3 machines available—one is practically new.

SULLIVAN W. G. 9—75 H.P.
—AIR COMPRESSOR

SULLIVAN NO. 16—125 H.P.
—AIR COMPRESSOR

Both in very fine condition, with complete electrical equipment; 220 Volt, 60 cycle A. C.

Other equipment:—No. 7 Whiting Cupola with new Foxboro Air Weight Control; Complete Laboratory; American Sand Cutter; American Dustube Collector; Whiting Tumbling Mill; Mold Wash Mixer; Hendey Mobile Yard Crane with Lifting Magnet. For information, address:

MR. M. R. GAULT
HANNIFIN CORPORATION
1101 S. KILBOURN AVE. CHICAGO 24, ILL.
TELEPHONE NEvada 8-0406

FOR SALE

1—#9 Whiting Cupola complete with Motor, Blower, and Blast Regulators.
1—#10 Whiting Cupola complete with Motor, Blower, and Blast Regulators.
1—#30 Beardsley and Piper Speedmuller with Loader.
1—27 x 36 Wheelabrator complete with Loader.
1—#1 Demmler Core Blower.
1—#2 Demmler Core Blower.
1—#3 Demmler Core Blower.
1—#193-8 Osborn Core Blower.
1—American Sand Cutter.
1—Johnson & Jennings Rollover Machine 24 x 30 table.
Many other items too numerous to mention.

HAYNES FOUNDRY EQUIPMENT CO.
814 ADA ST. KALAMAZOO 52, MICH.

FOR SALE

Gardner-Denver stationary air compressor, 125 lb. air pressure, Model WBE 3005, Serial #82625. Vertical three stage—7&5¾ x 5 three cylinder—water cooled—40 Horse Motor 220 or 440 direct drive. Guaranteed like new—$1600.00. 1—Redford cartridge core blower and clamp—$150. 1—Haynes 12″ jolt squeezer—$175. Guaranteed in new condition. Address: Box 717, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

1—Type P Class 1 Jeffery Sanditioner Serial No. 448, complete with motor used approximately 250 hours.

1—10′ Roto-cast revolving mold conveyor complete.

1—Type GF Pangborn sand blast less motor.

BOX 655
The FOUNDRY CLEVELAND 13, OHIO

FOR SALE

ELECTRIC MELTING FURNACE

TOP CHARGE 9 FT. DIAM. SHELL, WITH 2500 KVA TRANSFORMER. VERY LITTLE USED, IN GOOD CONDITION.

FRANK B. FOSTER, INC.
1217 OLIVER BLDG. PITTSBURGH 22, PA.

For Sale

EQUIPMENT FOR SALE

MOLDING MACHINES
1—74J-W Osborn Jolt Squeeze Portable.
2—75J-W Osborn Jolt Squeeze Portable.
3—75J Osborn Jolt Squeeze Portable.
1—Haynes 10″ Jolt Squeeze Portable.
1—Haynes 12″ Jolt Squeeze Portable.
3—Federal RAPID Jolt Squeeze Portable.
2—SPO #611B Stationary, Oscillating, Jolt Squeeze Strippers.
1—SPO #4½ JHS Air Jolt Hand Strip.
BLOWERS FOR CUPOLAS AND FURNACES
1—Piqua rotary pressure blower, rated 19 cu. ft. per revolution.
Maxon-Premix Blowers for Gas, ¼ to 1 H.P.
METAL MELTING EQUIPMENT
1—Hausfeld 2000# aluminum capacity furnaces, barrel type, open flame, oil fired.
2—Monarch-Rockwell Rotating, 500# brass, oil.
1—Buckeye #150 Crucible tilting furnace, with Premix blower for gas fire.
3—36″ dia. x 54″ long reliable tumbling mills.
New 32″ to 41″ Dia. shell Cupolas made to order.
TUMBLING MILLS AND SAND BLAST
1—Pangborn style GJ-1 rotoblast barrel, complete with Pangborn style FM automatic loader. Load capacity approximately 16 cu ft.
1—Pangborn No. 2 GH direct pressure type sandblast barrel, motor driven. Complete unit.
1—Pangborn LE 6 ft. sandblast table, continuous sand feed, motor driven. Complete unit.
1—Pangborn LE 4 ft. sandblast table, continuous sand feed, motor driven. Complete unit.
1—Pangborn Sand Blast Unit including generating tank, shot cleaner, bucket elevator. Suitable for use with room.
1—Pangborn type EN-2 sand blast cabinet, suction type, 5 x 3 x 7 high.
MISCELLANEOUS
1—Gardner-Denver air compressor complete with 5 HP 3/60/220 motor and controls.
4—Heavy duty flexible shaft grinders 2 HP.
1—Fay & Egan 14″ blade revolving, double arbor, tilting table, variety saw with roller table.
1—Young Bros. Co. tower core oven, 5′ x 1′ shelves, gas fired, complete with Foxboro Control.
1—Young Bros. Co. batch type recirculating hot air gas fired core oven, 5′ x 6′ door opening, 9′ deep.
3—Foundry Equipment Co., Sliding shelf core ovens with five 30 x 42″ shelves, 8″ high. Gas Fired.
1—Lampson Endless Mold Conveyor 100′ long x 16′ wide, with 19 x 26″ pallets, 36 inches on centers.

CLIFTON MACHINERY CO.
1023 W. 6th ST. CINCINNATI 3, OHIO
PHONE PARKWAY 7312

FOR SALE

25 HP Air Compressor—220 V.-Air cooled, Self contained—Bargain $375.00
5—Royer sand conditioners, each $285
Pangborn Model 3 CD 1 Dust Collector 2100 CFM—can be used with wheelabrator or rotoblast $350.00

BALCHER MACHINERY COMPANY
1884 S. COMPTON ROAD
CLEVELAND HEIGHTS 18, OHIO
PHONE: FAIRMOUNT 1186

FOR SALE

Whiting #3, model B cupola, complete with automatic skip-hoist, blower and spark arrester. Herman Pneumatic turnover and pattern drawing machine, 40″ x 58″, 3000 lb. 18″ cylinder, equipped with 45″ arms, practically new, complete with controls. Two Kron (Yale & Towne) scales, one 4400 lb. portable platform (30″ x 30″), other 1100 lb. dormant platform (46″ x 38″). For further details, write BOX 706, THE FOUNDRY, CLEVELAND 13, OHIO.

FOUNDRY EQUIPMENT

1—Osborn Core Blower, No. 193
1—Demmler Core Blower, Style 3-E
1—Osborn Core Box Drawing Machine #146
Molding Machines—Herman R.O. 1500 lb. cap.
Osborn Jolt Squeezers, various sizes
#1 and #2 Simpson Mixers, motor driven
1—#30 B. & P. Speedmullor

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO., NOT INC.
767 MILWAUKEE AVE. CHICAGO 22, ILL.
PHONE: CANAL 6-0314

For Sale

FOR SALE

TUMBLAST
ROTO-BLAST
FOUNDRY EQUIPMENT

1—36″ x 42″ TUMBLAST, complete with Skip Loader, Dust Collector and Spare Parts—LIKE NEW.

1—27″ x 36″ TUMBLAST, with Skip Loader—REAL BARGAIN.

2—#2 Multi-Table TABLAST — PRICED TO SELL.

1—Pangborn ROTO-BLAST, Horizontal Spindles—NEW, NEVER INSTALLED.

1—Pangborn Hand Sandblast Cabinet, complete with Dust Collector—Excellent Condition.

MOLDING MACHINE

1—#383 Osborn Jolt Squeeze Roll-Over—Like New—CHEAP.

GRINDER

1—15 H.P. U. S. Swing Frame Grinder complete, 24″ x 3″ Wheel—Used Very Little.

Location: Our Cincinnati Warehouse
PHONE: Mr. Don Whitehead
PRINCETON 8405 (Glendale, Ohio)

L. J. LAND, INC.
146 GRAND STREET
NEW YORK 13, N. Y.
CANAL 6-6976

FOR SALE
IN GOOD CONDITION

Cupola Blower. One General Electric centrifugal compressor. Type—F.S. 377, volume 10500, pressure 1.25, speed 3500.
General Electric Motor. Type FT 529 Y2 85 3600 Form E, volts 440, 3 phase, 60 cycle. No. 5226386.
With blast gate control panel, blast gate and motor starter.

BOX 699
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

1 Tool box 20x20x36 complete with side handles; 1 doz. ⅛ to 2″ chisels; 1 doz. ⅛ to 2″ inside bent gauges; 1 doz. ¼ to 1¼ spoon gouges; complete set bits; 6 assorted caliphers; 4 shrink rules; planes; 3 brace turning tools, etc.—$200.00 cash. Address: MR. F. L. DUHSE, 3310 McDONALD ST., COCONUT GROVE 33, FLA.

A REAL BARGAIN
FOR
A FOUNDRY, STEEL MILL OR FORGING SHOP
CRANE FURNACES CARS

1—Complete Open Hearth steel charging crane system with 2—25 ton Open Hearth furnaces, acid or basic type. Includes High Type Horizontal floor (4 motor) 5 ton Alliance Charging Crane, 50 Charging boxes, 12—4 Box furnace cars with railway, 35 ton Bottom pour Ladle, 4—5 ton Ladles, 2 unused, 2 used with graphite tips and plugs, all purchased new 1943. In excellent condition. Includes 200′ runway with fully protected conductor system for 220 DC.

HAWKINS & COMPANY
162 S. MICHIGAN AVE., CHICAGO 3, ILL.
PH: HARRISON 7-0725

SURPLUS FOUNDRY
EQUIPMENT FOR SALE

Top quality, excellent operating condition. Molding machines, benches, tumbling mills, pouring buggies and other supplies. For complete listing address:

BOX 728
THE FOUNDRY CLEVELAND 13, OHIO

Classified Advertising

For Sale

FOR SALE
COMPLETE EQUIPMENT OF GOING FOUNDRY

Including:

No. 7 Whiting cupola and Foxboro control
Wheelabrator, swing table 72"
SPO and Osborn molding machines
Despatch automatic gas core ovens
Cleveland tramrail system
Cranes and hoists, 2 tons to 10 tons

Many other items, all well-maintained and much of it almost new.

WRITE FOR COMPLETE LIST
MILLER FOUNDRY COMPANY
740 JENKINS AVENUE COLUMBUS 7, OHIO

MELTING DEPARTMENT EQUIPMENT FOR SALE

Three Bell type slag ladles 5'6", dia. 40" deep with 2" min. metal sections-walls-bases-trunions-1 lifting bale for same also available.
One Lectromelt top charge scrap bucket, segmented bottom with closing stand 6 ton capacity.

NO REASONABLE OFFER REFUSED
READING TUBE CORP.
P.O. BOX 126 READING, PA.

MUST SACRIFICE

1—Molder's Friend 60" sand cutter. An excellent machine in fine condition. Only $1100 for quick sale.
1—Stroman oil and gas fired reverberatory furnace equipped with new Hauck burners. Melts one ton of iron in 40 minutes with only 45 gallons of oil. A nearly new furnace costing $6000; will sacrifice at only $2000.

BAMBER FOUNDRY INC.
STAMFORD, CONNECTICUT

FOR SALE

American skip bucket loader in excellent condition. $500.00. Address: BOX 729, THE FOUNDRY, CLEVELAND 13, OHIO.

FOR SALE

Two Beardsley & Piper screenarators complete with motor, cord and plug for 220 volts in good condition, $75.00 each. Address: KEEN FOUNDRY CO., GRIFFITH, IND.

FOR SALE

40 steel-wheel trucks, 72" long x 36" wide. Steel-welded throughout. Roller bearings. Face 3½" rear, 3" front. Price $25.00 each. FOB Grand Rapids, Michigan. Send inquiries and orders to: 309 FEDERAL SQUARE BUILDING, GRAND RAPIDS, MICHIGAN.

For Sale

FOR SALE

1—Tabor Handram Power Rollover Hydraulic Molding Machine 30" table serial No. 24818.
8—Tabor Power Rollover Molding Machines—22" table
3—Osborn Rollover Hydraulic Box Draw Molding Machines—New 20" x 40" x 12" x 8" draw, model 147.
2—405 Osborn jolt rollover and pattern draw.
3—#94 Osborn Core Blowing Machines like new, with extra head each.
1—#91 Osborn Core Blowing Machines A-1 condition.
2—Tannewitz Metal Saws size G1E with 10 H.P. 220/440 V. Motor, like new.
1—Tabor cutoff saw with 10 H.P. Motor 220/440V.
1—Fisher Motorized Nose Pour Crucible Furnace Type AMM size 500 500# Aluminum, 1500# Brass complete with blower, gas or oil fired. A-1 condition.
1—Hausfeld No. 400 Hand Tilting Furnaces combination gas or oil fired with blowers complete A-1 condition.
3—No. 1000 automatic Fisher tilting furnaces. Capacity 1000 lbs. aluminum.
1—#404 Clearfield Sand Mixer 4 cu ft. capacity, like new.
4—Overhead cranes—Norton hi-lift
1—2-ton capacity 16'7" span
1—2-ton capacity 22' span
1—10-ton capacity 16'7" span
1—10-ton capacity 18' span
all floor operated
Various sizes steel flasks.
Various sizes transite core plates.
Various sizes Popoff flasks and jackets.
Various sizes Snap flasks and steel bands.
Other various equipment for foundries.
EUCLID FOUNDRY & MACHINE EQUIPMENT CO.
15019 SARANAC RD. CLEVELAND 10, OHIO
PHONE—GL 1222

FOR SALE

Ransohoff Drum Type Wash Rinse and Dry Machine, Serial No. 2525, capable of handling items up to 6" on the longest dimension.
Two Goulds pumps, rotary, I M B 2 S head 289-ft. 3550-gpm with Westinghouse 15 HP—3 phase 60 cycle—220/440 volt motors.
Niagara #56 hand lever punch 24" throat, bench type.
Detrex Corp dressing solvent reclamation still 36" wide 48" deep x 74" high W ⅛-3-60-220/440 Howell motor Model S50.
Rivet sorting machine, 3 feed hoppers 2 motors.
Alemite 7' x 3' x 3' steel tank 259' lead cooling coil.
Skinner Bros. Baltz Pot 4-1 heating unit.
One Spray Booth Roto-Clone Hydra-Static precipitaton Type N Class 500 Size 8.
One Washing Machine model 9427 Drying systems Inc 100 gpm Cost $763. Automatic cleaning operation.
3D Gardner buffing machine 5 HP motor 220/440. New in 1944. Each side can be operated independently.
MANSFIELD SANITARY POTTERY INC.
PERRYSVILLE, OHIO

For Sale

FOUNDRY EQUIPMENT
BLOWERS

1—"Spencer Turbine" 24 oz. 1050 CFM with 10 HP mtr.

MOULDING MACHINES

6—Tabor molding mchs., split pattern-jolt squeeze 13" x 18"
2—Tabor molding mchs., special shockless jar squeezer 10"
1—Osborn #42 Molding mch, portable
1—Arcade molding mch, portable—hand draw and jolt 16" x 12" plate

MISCELLANEOUS

1—Sand blast room "Sly" 10' x 10' complete with tank, blower and mtrs.
1—Vacuum Cleaner, portable "Spencer Turbine" with 3 HP motor
1—Alligator shear "Hendley & Whittemore" #46 less motor
1—Snag Grinder, "Standard" double end, 18" wheel
1—"Ingersoll Rand" Air Compressor, 2 stage Imperial type 10B low pressure side 22" dia. x 16" stroke—high pressure side 13" dia. x 16" stroke, with 200 HP induction motor, slip ring type and controls
1—Ingersoll Rand air compressor, 2 stage Imperial type XB, right hand size 16" x 14", left hand size 10" x 14", with 104 HP motor, starter, flat belt drive and air receiver tank 3½' dia. x 10' h.

FURNACES & OVENS

1—Furnace, elec. heat treat, "Electric Furnace Co." 14' L x 6' W x 6' hi., 250 KW-220V complete with controls
1—Furnace, heat treat, "Industrial-Circ Air" gas fired car type 14' L x 6'6" W x 6' hi., complete
1—Furnace, annealing-continuous, "Industrial Heating", 26'6" x 6' W x 17" hi., gas fired, complete
7—Furnaces, melting "Bellevue", 550# capacity
1—Atmosphere converter (gas cracker) gas fired G.E. mod. #6990139-G4, 500 CFH
1—Oven, normalizing gas fired "Dewey" 6' W x 7' D x 6' H outside dim.
1—Furnace, melting gas fired muffle type Surface Combustion
1—Furnace, melting, rotary hearth, gas "Continental" approx. 18' dia.
1—Furnace, pre-heating rotary hearth, elec. "G.E.", 175 KW, 18' dia.
1—"Lindberg" cyclone tempering furnace, type 6012042EH, 1800KW, 3/60/440 with (2) 3 hp motors, 2 zone control panel with model 5 "L&N" recorder-controller, Wheelco limitrol and Lindberg type A fuel input controller
1—Oven type furnace "American Gas Furnace Co." #1, 7" x 12" x 29"
27—Fisher melting furnaces, size B for #25 crucible
7—Hoskins electric furnaces, model FR 252.9 box type, 2000 deg. F. 26 KW
6—Monarch simplex melting furnaces, 500# cap., model #92, oil fired—hand rocking. 1 burner on each end of furnaces, rammed with plastic brick and lined with 1" of SO 38 refractory
1—Monarch Simplex furnace, 1000 lb. cap. with blower and motor.

BOHN ALUMINUM & BRASS CORP.
1400 LAFAYETTE BLDG., DETROIT 26, MICH.

FOR SALE

1—American Wheelabrator Multi Tablast Model BM 66200 Serial Number A50689
1—Whiting Cupola #6—50 foot stack. Dismantled and in excellent condition
1—Spencer Turbo Compressor with 40 HP motor
7—Overhead Pouring Devices
1—Simpson Mullor Model O
1—Root Blower Number 7
1—Champion Core Blower Model CB10
1—Lindberg Pit Type Tempering Furnace Type 2828-EH Serial Number 1337
12—Tabor Stationary Jar Top Squeezers
4—Osborn Squeezers 276-J
2—Tabor Jar Ram, Hand Rollover, Hand Draw Moulding Machines
Rollover, Hand Draw Moulding Machines
6—Tabor Hand Ram, Power Rollover, Hand Draw Moulding Machines
2—Tabor Portable Jar Flask Lift Moulding Machines—Table size 20" x 24"
1—Tabor Portable Shockless Jar Flask Lift Moulding Machine—Table size 32" x 32"

OLD COLONY FOUNDRY CO.
EAST BRIDGEWATER, MASSACHUSETTS

CLASSIFIED ADVERTISING RATES

POSITION WANTED—Minimum advertisement set solid, 30 words, $2.00. Additional words 7c each.

ALL OTHERS—"Help Wanted"—"For Sale"—"Wanted"—"Personals"—"Services", etc., minimum advertisement set solid, 30 words or less, $4.00. Additional words 12c each.

NOTE—If replies are to be sent to a box number in care of THE FOUNDRY, add 6 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

• • •

Classified advertising forms close 13th of month preceding issue.

It's a Bigger, Better Bonus when you give it in Bonds

It's a *bigger* bonus when you give it in U. S. Savings Bonds. That's because Savings Bonds pay $4 at maturity for every $3 purchased. If it's a $75 bonus, for example, and you give the bonus in bonds, the employee receives—not a $75 Bond—but a *$100* Bond. And he *collects* $100 if he holds the Bond till maturity.

It's a *better* bonus when you give it in Bonds. It encourages saving among your employees—helps to make them more secure, more stable, more contented and productive on the job. (That's borne out in the more than 20,000 companies that make Bonds available to employes through the Payroll Savings Plan!) Another reason is that the more Bonds people hold today, the greater will be tomorrow's purchasing power—without which no business can prosper! Then again, Savings Bond sales aid the nation's economic security by spreading the national debt.

Thus you help your employees, your company, and the good old U. S. A. itself—which means *yourself*!—when you give the bonus in Savings Bonds . . . and when you push the Payroll Savings Plan. All the facts and assistance you need are available from your State Director, Savings Bonds Division, U. S. Treasury Department. He's listed in your phone book. Why not ask your secretary to get him for you right now?

The Treasury Department acknowledges with appreciation the publication of this message by

THE FOUNDRY

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

FREEMAN *Dowmetal* PATTERN PLATES

All Plates Shipped Same Day Order is Received

TRY THEM FOR
COPE AND DRAG MOUNTINGS

FREEMAN DOWMETAL PLATES COST LESS

For years many foundries have used FREEMAN PATTERN PLATES as they are LIGHTER, STRONGER and IMMEDIATELY AVAILABLE in ANY SIZE AND QUANTITY. Surfaces are held to CLOSE PARALLEL TOLERANCES and plates are of UNIFORM THICKNESS.

With their clean VELVET FINISH, plates are received in proper condition for mounting patterns. Drilling, tapping and NECESSARY MACHINING to mount patterns is DONE MORE EASILY on free-cutting DOWMETAL PATTERN PLATES.

For regular pattern or cope and drag work, we can furnish ANY PRACTICAL SIZE 5/16"—3/8"—1/2"—5/8"—3/4"—1" THICKNESS. When ordered by flask size, we allow 1" for flask and 2-1/2" on each end for pins and ears. If square or rectangular plates are desired, specify overall size and thickness. For special shapes send a template or sketch. LITERATURE AND PRICE LIST AVAILABLE.

THE FREEMAN SUPPLY CO.

Pattern Shop and Foundry Supplies and Equipment
Mahogany and Pine Pattern Lumber
1152 E. BROADWAY TOLEDO 5, OHIO

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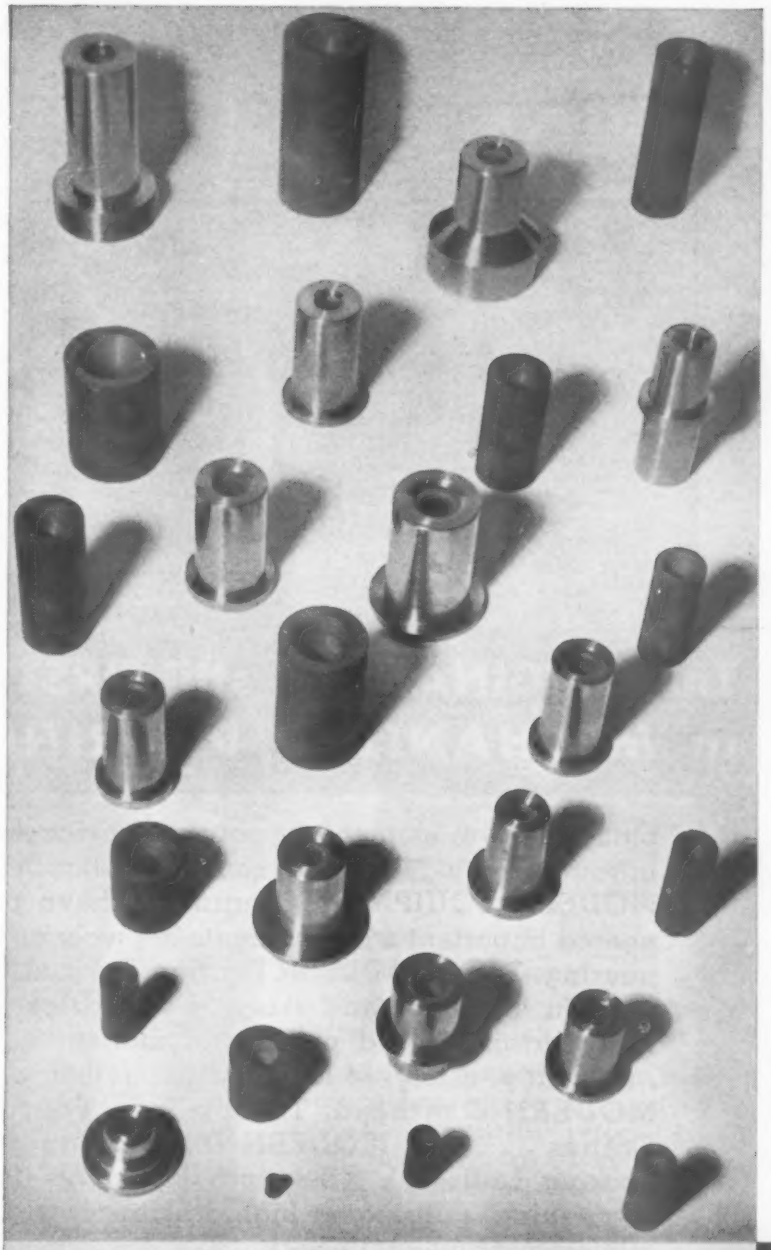

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NORBIDE nozzles are made of Norton Boron Carbide—the hardest material made by man.

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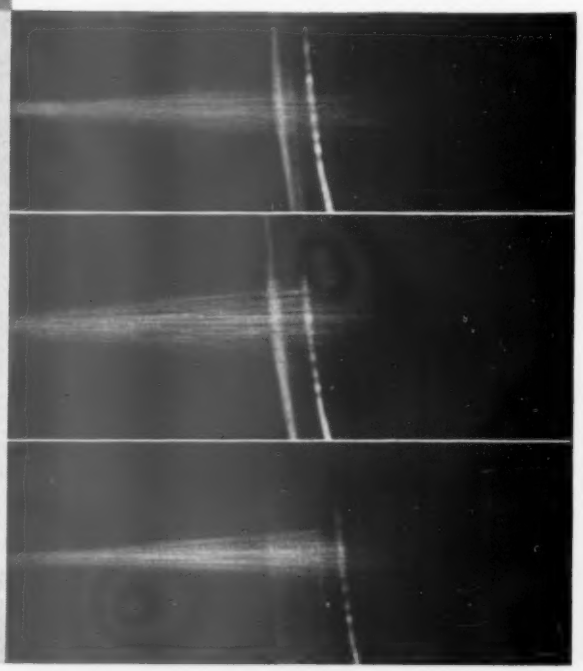
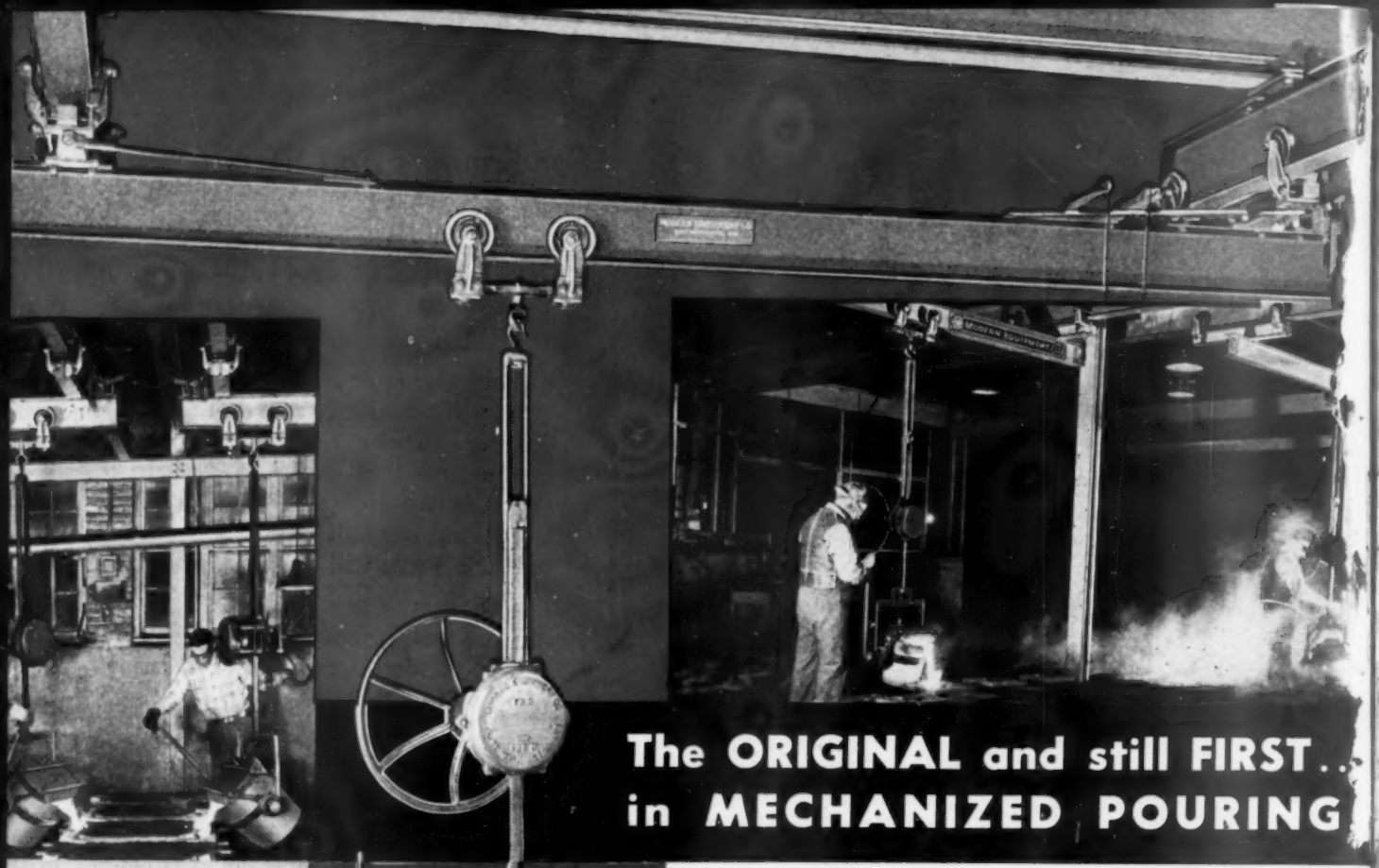


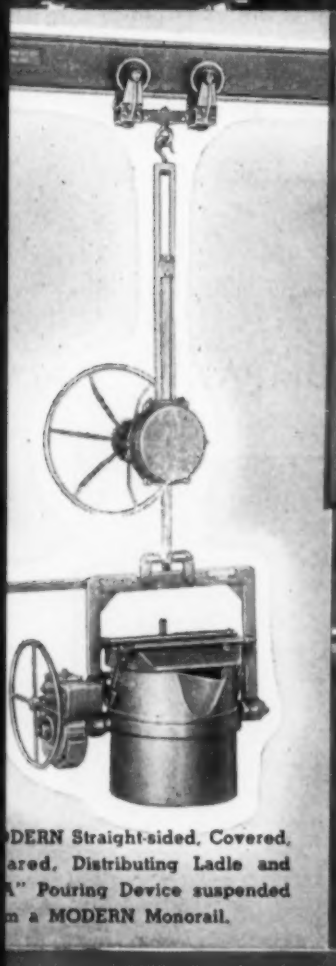
High-speed photograph of stream from new iron nozzle—note that stream concentration and abrasive velocity and volume are fair

Stream from the same nozzle after three hours with silica sand. Outlet opening worn to twice original size—stream concentration poor, abrasive velocity and volume low

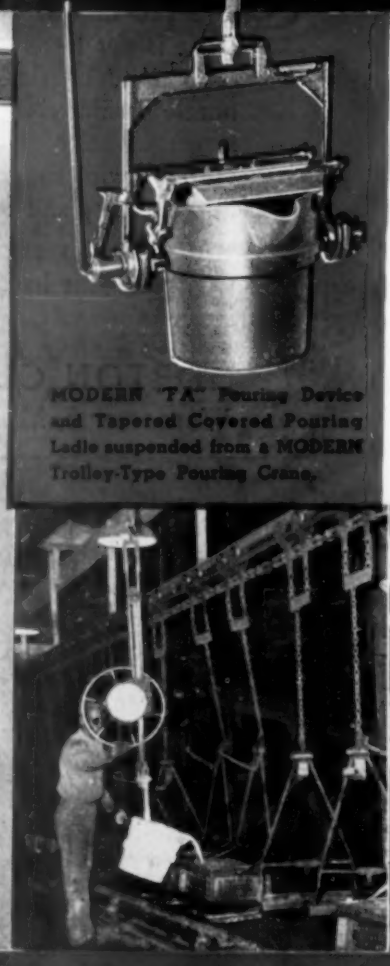
Stream from Norbide Nozzle after 404 hours with sand—outlet diameter worn only 0.032"—hundreds of hours of useful life remain—marked stream concentration—high abrasive velocity and volume



The ORIGINAL and still FIRST.. in MECHANIZED POURING



DERN Straight-sided, Covered, ared, Distributing Ladle and A" Pouring Device suspended m a MODERN Monorail.



MODERN "TA" Pouring Device and Tapered Covered Pouring Ladle suspended from a MODERN Trolley-Type Pouring Crane.

Since the first elementary pouring device was introduced by MODERN, some 30 years ago, MODERN EQUIPMENT Engineers have pioneered important advancements in mechanized pouring. Today, MODERN Pouring Devices are used in all types and sizes of foundries for the distribution and pouring of molten metal . . . swiftly, safely, at low cost! Together with MODERN Overhead, Trolley-Type Pouring Cranes . . . and MODERN Distributing and Pouring Ladles . . . they provide *completely mechanized pouring*, at high efficiency, with a minimum of manual effort.

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Ask the MODERN Sales Engineer in your area, or write direct, for suggestions on a Completely Mechanized Distributing and Pouring System for Your Foundry.

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LONGER LASTING PERFORMANCE

costs you nothing extra when you buy

Stevens Stamped Steel Ladle Bowls

Longer lasting performance is a *value beyond purchase price*, which has always identified Stevens Stamped Steel Ladle Bowls as the most economical you can buy.

Unlike any similar product, Stevens ladle bowls are deep drawn from single sheets of specially selected steel, to provide a "built-in" value of extra strength and durability—to insure *extra-long* service life. Stevens Stamped Steel Ladle Bowls can save you many maintenance, repair and replacement dollars—cost no more than you might pay for an ordinary bowl. Proof? You'll find it in the purchase.

STEVENS COMPLETE LADLE EQUIPMENT LINE INCLUDES

- BUGGY LADLES
- CRANE LADLES
- MIXING LADLES
- TROLLEY LADLES
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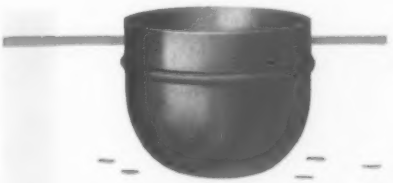
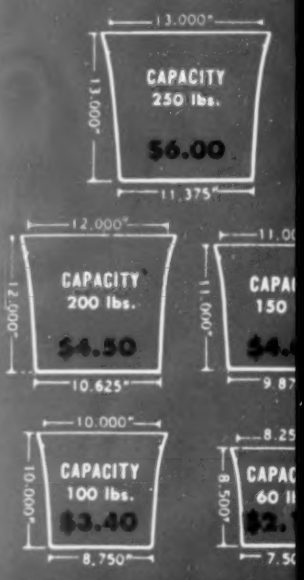
TYPES, SIZES AND CAPACITIES TO MEET EVERY NEED



STEVENS ROUND BOTTOM STAMPED STEEL LADLE BOWLS ARE IDEAL FOR FLAT STREAM POURING

Style "S" 60 lbs. capacity
Style 108 50 lbs. capacity

STEVENS FLAT BOTT STAMPED STEEL LA BOWLS ARE SIZED A PRICED "RIGHT"



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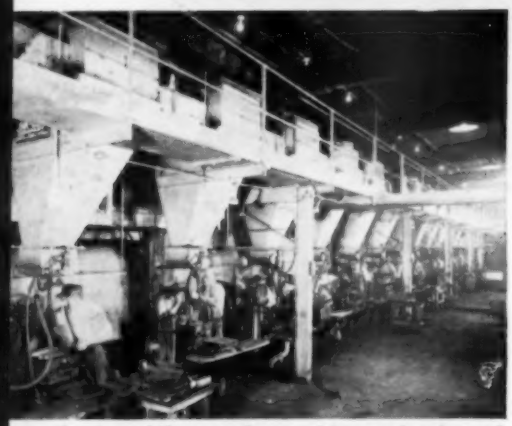
FOUNDRY EQUIPMENT AND SUPPLIES DIVISIO

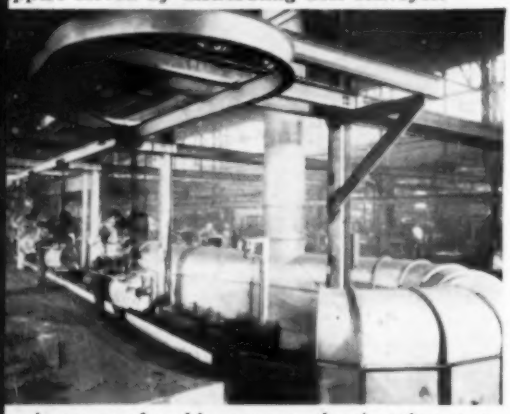
The key to highest efficiency in foundry mechanization • •

-Belt "PA," itive-Action llating Con- or in tunnel er floor of hanized mal- le iron foun- delivering sand and cast- to Link-Belt Leak overlap- steel apron veyor for sfer to shake- screen.

Right: General view of sand handling and preparation unit showing shakeout, elevator and old and new sand storage bins feeding to mixer.



ne of 14 molding stations, with overhead sand ppers served by distributing belt conveyor.



uring zone of mold conveyor, showing three men uring hot metal into molds which then pass rough the ventilated enclosure around to other de of conveyor.

• Link-Belt custom layouts with standardized units

Hardly any two foundry mechanization problems are alike. However, there is one common denominator: the ability and experience of Link-Belt engineers in planning custom layouts to bring about the highest efficiency and lowest costs, using standardized Link-Belt units such as illustrated.

Some typical customer reactions: *more than doubled our production in the same floor space . . . eliminated a bottle neck at the shakeout . . . far less maintenance than with other system* (said of oscillating conveyor) . . . *made the foundry a clean place to work, no smoke* . . . etc., etc.

The list of prominent foundries mechanized by Link-Belt engineering and equipment is imposing.

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MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

THE FOUNDRY

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The Penton Publishing Company
Penton Building
Cleveland 13, Ohio

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Ed—Editorial **Q & A—Questions and Answers** **FD—Foundry Developments**

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